RAILROAD GAZETTE

FRIDAY, OCT. 16.

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Contributions.

Wear of Couplers.

NEW YORK, Oct. 13, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The following may prove of interest to those who have taken up the question of the wear of couplers of the M. C. B. type.

The Barnum & Bailey Circus train consisting of 64 cars was equipped early in the Spring with the Robert-Eastwick coupler. All these cars are longer than usual and most of them are over 60 ft. They are all equipped with air brakes. They are run in a train of three sections, one of which generally consists of 20 to 25 cars, requiring as a rule two engines to haul it. As these cars are kept together and are not used in connection with the old style link and pin drawbar they afford a good opportunity for observing the wear of M. C. B. couplers due to use with others of the same type.

Since these cars were equipped they have travelled up to date 8,016 miles over all varieties of track, grades, curvature, etc. The wear on the inside face of the knuckle is so small as to be hardly perceptible. The surface of the metal was worn smooth and polished, but the amount of metal actually worn away did not exceed $\frac{1}{64}$ in. The wear on the inside face of the guard arm was even less noticeable and even where, by warping of the metal in casting, or from some other cause, the wear was concentrated in one spot the effect was only shown in leaving the surface smooth.

The greatest wear developed was at the tail of the knuckle where it bears on the locking pin. Even here it did not exceed $\frac{1}{64}$ in. and made no perceptible difference in the opening of the knuckle. The wear developed here, small as it was, was rather unlooked for, as the large bearing surface of the locking pin and the long lever arm at which it works in this design of coupler reduced the wear at this point to a minimum. It may indicate that in couplers where the locking pin operates at less advantage to the line of draft, the wear here may prove great enough to be troublesome.

We may add that the general performance of the coupler was very satisfactory. There were no breakages whatever and Mr. Bailey reports his animals and stock in much better condition than usual owing to the greater steadiness of running. G. C. THAYER.

The New York Rapid Transit Problem.

NEW YORK, Oct. 10, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In trying to get light on the exact process known as the Greathead, I find nothing more detailed than the account published in *Engineering*, April 15, 1887. Perhaps you can inform me of some account more recent and equally explicit as to method.

The cut and the explanation there given of the method proposed by Mr. Greathead for boring (literally) through rock, is not reassuring as to his ability to prosecute excavation in hard rock. He proposed to cut out the full sized tunnel by a revolving head set with cutting tools, something after the method attempted by Mr. Haupt at the Hoosac Tunnel. This process was carried on there for about 6 ft. (if I remember correctly the beautiful cylindrical cut left by it) and was then abandoned on account of its expense.

In tunneling through rock the only apparent saving of expense, if any, of the iron and grout lined tunnel would be made in the cost of lining. This being the case it seems to be in order for those who estimate the cost of a four-track tunnel, or four single track tunnels under New York to give some itemized statement of the cost of their construction, generally stated as $1,000,000 per mile. Perhaps they can give their reasons also for believing that a tunnel of the size proposed can be driven under New York in some of the most uncertain and unhomogeneous material in the world, without an adit or a convenient dump, for one-third or one-fourth the cost of what such a tunnel *would* cost (for no such has been driven I believe anywhere) anywhere else in the world.

W. HOWARD WHITE.

NEW YORK, Oct. 10, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I hope you will give us copies of the drawings of the Worthen and Parsons plans for rapid transit, especially at the stations where the real difficulties are to be found. I maintain that a four track road with platforms of proper widths will encroach on the building lines.

How can Worthen get access to his middle or express platforms except under or over the local tracks? If over, he must interfere with pipes, or else sink the whole line that 9 ft. 6 in. and put his station in a hollow.

Also, how can Parsons run his cars, which he tells us will have the same height and width as those on the Elevated Railroads, in a tunnel 10 ft. high? The body alone of the Manhattan cars is 9 ft. 6 in. high over all. Where do the trucks come in?

There was a plan suggested by somebody to have the bodies of the cars between the trucks, so that the floor come within 6 in. of the rails. Do you know if such a plan has ever been put in successful operation? Would there not be grave difficulties in going around the proposed loops? T. C. CLARKE.

High-Speed Locomotives.

CORVALLIS, Or., Oct. 2, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to your editorial of Sept. 25 regarding the fast run of the Reading train, will you allow me respectfully to suggest that the comparisons you draw should lead us to a different conclusion from that arrived at? A glance at the small tabulated comparison below shows that there was something wrong in the design of the Philadelphia & Reading engine, and makes it questionable whether she is "well adapted for high speeds."

The details of the run made by the English engine are taken from the *Railroad Gazette* of March 28, 1890. The speeds were taken, and furnished to the *Gazette* by Mr. Worsdell.

Locomotive.	Drivers.	Total weight eng. and train, in tons.	Grade.	Speed m. per hour
Phil. & Read.	Coupled. 5 ft 8½ in.	169	Level at bottom of down grade.	90.5
No. Eastern..	Single, 7 ft. 8½ in.	347½	Level at top of up grade.	86

Of course the rule of three cannot be applied to these questions of speed, yet one cannot help asking: If the English engine moved a total dead weight of 347½ tons at the rate of 86 miles per hour, how fast could it have moved 169 tons, *or less than one-half that weight?* Facts are eloquent, and for one I think that had the Worsdell compound been at the head of the Reading train we should have seen the locomotive engineer's dream of 100 miles an hour realized. Your readers will agree that as a high-speed, load hauling performance, that run in the North Eastern counties stands to-day unapproached and absolutely without a parallel. To what cause are we to attribute the disparity between these two engines?

Of causes external to the engines we may dismiss:

I. The atmospheric resistance; since the far greater length of the English train would involve a larger "skin friction," if we may use the term.

II. The track; for the P. & R. ranks second to none in the world.

III. The cars; for it goes without saying that trucks run easier than rigid wheel bases.

Then, obviously, the superior performance of the single driver must be credited to the details of its design, as follows:

1. Large diameter, of drivers, giving low piston speed. At 90 miles the revolutions would be: Worsdell compound, 331; Philadelphia & Reading, 445.

2. Compounding, with its gentle exhaust.

3. Single drivers, giving ease of running, in reducing the total bearing surfaces, by the amount of four coupling rod ends. Moreover, even if we allow that coupling rods may be perfectly counterbalanced, we must remember that the rods are twice as far, measured horizontally, from the journals as are their counterbalances. This produces lateral disturbing forces that become serious at the enormous speed of 445 revolutions per minute. To this must be added the excessive friction set up if there is the least variation in the wear of the coupled wheels.

4. Inside cylinders, minimizing sway. The reciprocating parts lying near the centre line of the engine, the disturbing moments are reduced to a minimum.

The steam sanding apparatus removes all objection to single drivers on the grade. This was conclusively proved when Drummond's 7-ft. single averaged between Carlisle and Edinburgh 59.9 miles per hour for 100 miles, climbing two summits of 1,015 ft. and 870 ft., and on the former climb averaging 42.7 *miles for* 10 *miles up a* 133 *per cent. grade.*

In the Chicago exposition year we shall see English engines hauling American trains in competition with American locomotives, a competition first suggested for the Edinburgh exposition year. If we are to "keep up our end" for high speed, we must build engines that shall have single drivers of large diameter; if we would beat the Britisher in speed and economy both, we must compound them.

It will be something new if in adopting we do not improve these features. J. BERNARD WALKER.

Calling Attention to Signals Carried.

NEW YORK, Oct. 1, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Within the past week two serious collisions have occurred with fatal results. In each case the second (or later) section of a regular passenger train was the colliding train, the obstructing train in one instance being a work train, working within limits, and in the other a regular freight train being off its rights. In the case of the work train its crew is reported to have either not seen or to have disregarded the signals carried by the regular train for its following section, and in the other case the attending circumstances point to the same cause.

It is a universal time-table rule that all trains having following sections shall carry flag signals by day and lamp signals by night on their engines, and under the standard code the additional precaution is required that the engineman call the attention, by whistle signals, of all trains passed or met, and that the same must be acknowledged by whistle by all such trains.

These two recent events raise the question whether or not under the rules the door is not open far enough for carelessness to walk in? It is a rule upon a prominent Eastern railroad that if the whistle signal of the engine carrying signals for a following section is not acknowledged the engineman must bring his train to a full stop, and repeat the signal until it is acknowledged, and cover himself with the usual delay report at the end of his run. Might not a more general adoption of this rule be profitable? SUPERINTENDENT.

[The rule referred to by our correspondent is No. 48 of the standard code, though in that code the duty of stopping to get an acknowledgment of the whistle signal (when not promptly heard) is not expressed but implied. There is a strong sentiment in some quarters that it is wrong to call attention to the flag in this way, because it leads freight-trainmen to relax their vigilance; and the objection was made at the meeting of the Superintendents' Association last year that an engineman at work beneath his engine would make no effort to see the signals upon a passing train, depending wholly upon the whistle, thus compelling the passenger train to stop. Besides the disagreement as to whether the whistle signal should be given at all, there is disagreement among those who employ it as to whether it should be given on double track as well as single. In view of this great diversity of views perhaps the principal moral is, Have a block system.—EDITOR RAILROAD GAZETTE.]

American Society of Railroad Superintendents.

The annual meeting of this society was held at the Hotel Brunswick, New York City, on Monday of this week, President H. Stanley Goodwin (Lehigh Valley), in the chair. About 35 members were present.

The first business was the adoption of amendments to the constitution. The article on membership was amended so that any officer holding a position higher than superintendent will be eligible to election as an active member; and the clause specifying the classes eligible to honorary membership was amended by the addition of "Assistant Manager" after General Managers. Action was also taken to make the signal committee, appointed last year, one of the standing committees of the society. Twenty eight new members were voted in, together with two associate members who were nominated at the last meeting.

The report of the Executive Committee, which was adopted, showed the financial condition of the Association to be flourishing, all the members except two having paid their dues, and the balance in the treasury being $940. The secretary's report showed a membership, including those elected at this meeting, of 198, representing 111 roads and 90,000 miles. Nineteen members have resigned during the year. The receipts for advertising in the pamphlet containing the proceedings of the meetings have been $587 for the year. The secretary recommended the more active encouragement of associate membership, suggesting that much valuable talent might be brought into the Association in this way. He also suggested further consideration of the plan of awarding annual prizes for papers, as was done two years ago with satisfactory results. The secretary has had correspondence during the year with the Master Mechanics', Master Car Builders', Roadmasters' and Train Dispatchers' associations. Messrs. Mackie and Graves, of the latter, were in attendance at the meeting and told of their action in suggesting alterations in the standard code to the American Railway Association.

The Committee on Transportation made no formal report, but it has sent out a circular and obtained replies concerning a question in train dispatching. It is as to the right of a dispatcher, under the standard code to make a definite meeting point at an intermediate station, for two trains whose rights have been reversed by an order under Form C, without first annulling the earlier order. Eighty replies were received, and they are so complicated that they could not be satisfactorily classified. The preponderance of opinion seems to be that the dispatcher can thus make ameeting point, provided he adds a superseding clause. The question has numerous ramifications, however, and was not discussed at the meeting.

The report of the Committee on Roadway discussed tie plates and patent spikes. The former is recommended in general terms, but the Davies spike, although showing favorable results, should be made the subject of more extended experiments. The Goldie spike has been used with much satisfaction by members reporting to the committee. The report holds that 80 lbs. per yard should be about the maximum rail section for economical service. The number of ties should be increased before further enlarging the rail.

In the discussion on this report Mr. Fleming stated that he was using the Goldie spike. From personal tests he thought that these spikes were not much harder than iron spikes. On the price being advanced he resumed the use of iron spikes. President Goodwin and Mr. Redmon (Iowa Central) had used the Goldie spike with good results.

The Committee on Machinery made a brief report on continuous heating of passenger trains and on the use of malleable iron in car construction. The New York, New Haven & Hartford has equipped 200 passenger train cars with the heating system of the New York Safety Car Heating and Lighting Co., 350 cars with the Consolidated Car Heating Co.'s system and 50 cars with the Leland heater. The cost, in addition to the cost of the regular Baker system, is $165 per car. Steam for heating cars at terminals is obtained from a variety of sources; from shop boilers, from boilers used to heat station buildings, by special boilers and in two cases from a gas or electric light company. The inspector of air brakes has been put in charge of the heating system and he is engaged in instructing the trainmen. The officers of this road say an effective regulator for controling the degree of heat in the cars is still an important desideratum.

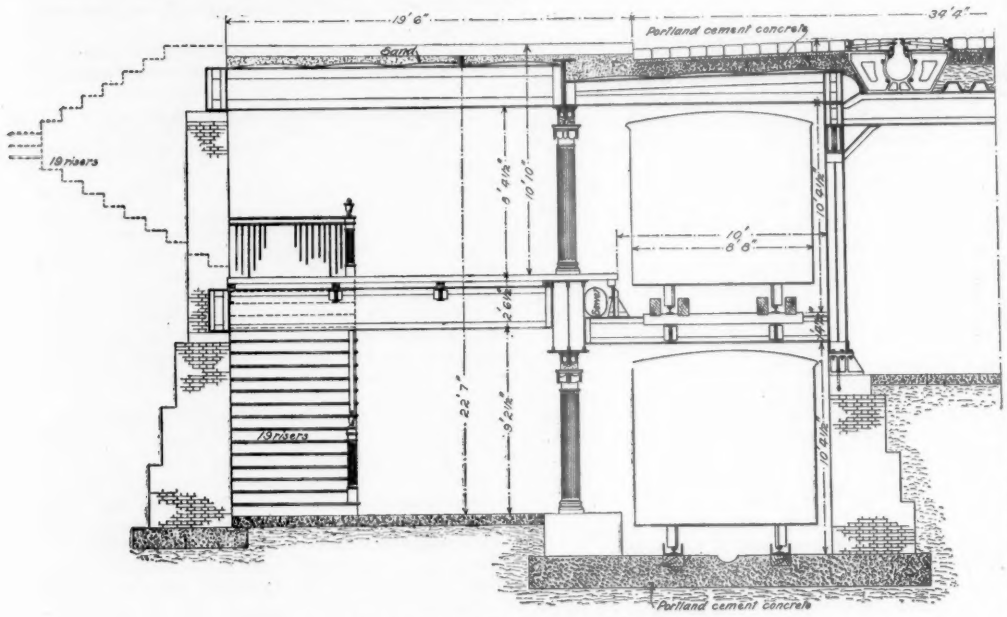


Fig. 1—Cross-section at Rector Street.

In the election of officers C. W. Bradley (West Shore) was chosen First Vice-President and G. W. Beach (N. Y., N. H. & H.) Second Vice-President; and for members of the Executive Commiteee for two years Messrs. R. G. Fleming (S. F. & W.) and O. M. Shepard (N. Y., N. H. & H.). At this point an intermission was taken for luncheon, after which Mr. Willard A. Smith, of Chicago, Director of Transportation Exhibits of the World's Columbian Exposition, addressed the meeting on the plans and prospects of that enterprise, giving a general outline of what is to be done and asking the cooperation of railroad officers. Mr. Smith emphasized the fact that many valuable relics of the old days of railroading in this country are being destroyed and lost, and urged upon the members the importance, from a historical point of view, of stopping this carelessness. Mr. Smith was chosen an honorary member of the association, and the executive committee was directed to take up the matters presented by him.

Mr. W. G. Wattson, Division Superintendent of the West Shore, read an interesting paper on Economy in Train Service, which will be found in another column. In the discussion which followed on this subject, Major R. M. Sully (Richmond & Petersburg) moved that the Committee on Transportation "devote its time during the coming year" to the preparation of a catechism for the examination of employés (trainmen). The motion was carried.

It having been voted that the President appoint a committee of seven on signaling, he announced the following, the first five being members of the same committee for the past year: J. J. Turner (P. C. C. & St. L.); James Donnelly (Lehigh Valley); C. H. Platt (Grand Central Station); J. H. French (Old Colony); C. D. Hammond (Delaware & Hudson); W. G. Wattson (West Shore); O. E. McClellan (Pennsylvania). It does not appear whether this is the standing committee provided for earlier in the meeting.

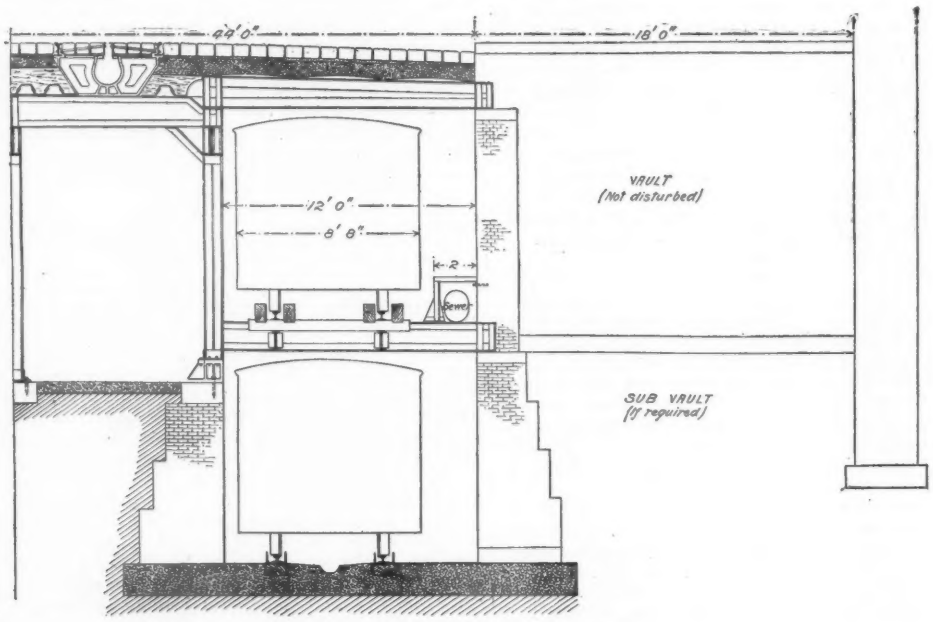
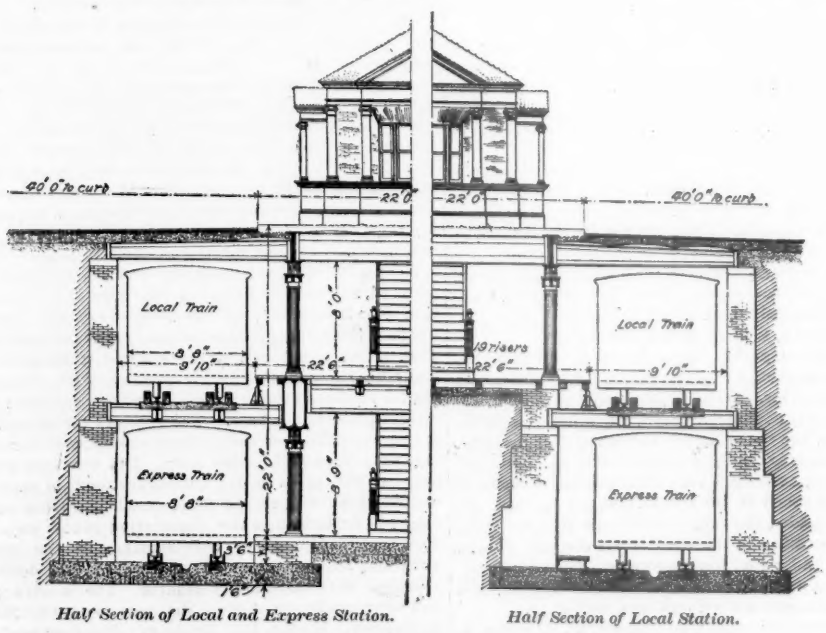


Fig. 2—Half Section Above Canal Street.



Half Section of Local and Express Station. *Half Section of Local Station.*

Fig. 3—Boulevard Line.

THE PARSONS PLAN.

The society marked the close of its tenth year of existence by a dinner at the Brunswick in the evening, a letter ballot having shown an almost unanimous sentiment in favor of the project. About 40 members and guests were present, and the dinner proved very enjoyable and successful. It will doubtless be a regular feature hereafter.

The Worthen and the Parsons Plans for Rapid Transit in New York.

We are permitted to give engravings from the drawings submitted by Mr. Worthen and Mr. Parsons with their reports, abstracts from which we published last week.

THE PARSONS PLAN.

In fig. 1 is shown a half section of the Parsons structure at a station at Rector street. Concerning this little need be said in addition to what was published last week. It will be seen that access to the local trains, which will carry considerably the great part of the traffic, is very convenient, the station platform being but 10 ft. 10 in. below the sidewalk grade and the approaches by broad and easy flights of stairs. The express trains are also reached by easy stairs. Here the tunnels are each 10 ft. 4½ in. in the clear, which gives a car body 8 ft. 2 in. high by putting the centre of the truck axle a little above the lowest outside line of the car body. As the seats run longitudinally, the truck wheels occupy no space that would otherwise be used, that is, they are in the space under the seats, and would still leave sufficient room for heating pipes. The cars proposed are 46 ft. long, with side entrances; the doors being, however, near the ends. It is proposed to construct the cars

without end platforms but with vestibules, leaving but 15 in. between the ends of adjacent cars.

The pipe gallery at Rector street is about 14 ft. wide. The street here is 34 ft. 4 in. between curbs; therefore, the railroad tunnels and pipe gallery must encroach upon the vault spaces somewhat. Inspection of this drawing shows how easy it will be to drop the express tracks slightly and to raise the floor of the pipe gallery and thus allow sufficient headroom to get crossovers and middle standing tracks.

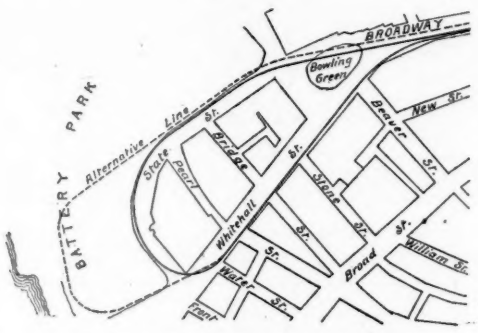


Fig. 4—Loop in Lower Broadway.

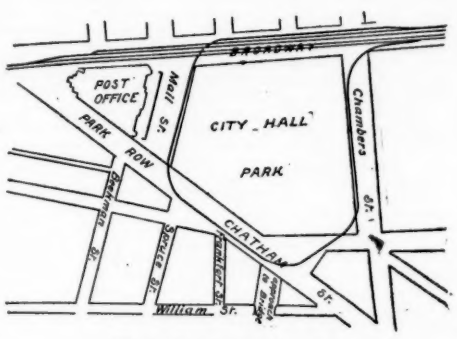


Fig. 5—Loop to Brooklyn Bridge.

Fig. 2 is a half section above Canal street, where the street is full 44 ft. between curbs. Here the pipe gallery is wider, being about 18 ft., and the transverse span is broken by a centre line of posts. The pipes and conduits are larger and more numerous in this part of Broadway than at the lower end and require therefore a larger gallery. The scheme for carrying the various gas, water and steam pipes and electric and pneumatic subways, which has been worked out in some detail, we do not show, nor the plan for getting the pipes into and out of the gallery. This last necessity is provided for by sinking the grade of the express tracks about 5 ft., permitting a passage to be made between the two tracks into the gallery. Through this passage a section of pipe of the maximum length and diameter can be rolled, and through it the side connections with the sewers and other pipes may be taken off.

Fig. 3 shows a half section of a local station and a half section of a local and express station on what is called the Boulevard line. Here the street is very wide, aggregating 102 ft., including the middle Parkway. It is proposed to put the stations in this Parkway, and the details are clearly shown in the engravings. This arrangement has the great advantage that a local station can be changed to an express station at very little expense, and also that new stations can be easily put in between those originally built. Of course it is impossible now to say what would be the best arrangement of stations in the thinly built part of the city, and it is an obvious advantage to have them so designed now that after changes can be made at little expense.

One of the minor advantages of Mr. Parsons' plan is that no swings in the tracks are necessary at stations. It is held by Mr. Worthen, and by some of the engineers who have reported on these plans, that it is no objection to his scheme that local tracks must be curved at approaches to all stations. We believe however that every railroad operating officer will admit that this is an objection sufficiently serious to be avoided at some trouble and expense.

THE WORTHEN PLAN.

In fig. 4 is shown the Battery Park loop, and in fig. 5 the single track loop to the Brooklyn Bridge, as proposed by Mr. Worthen. It will be remembered that Mr. Worthen, as well as some of the engineers consulted, hold that one track down and one up for that part of Broadway below City Hall will be sufficient. It will be seen that he has therefore provided for working this part of the line with two tracks instead of four, running all trains around the loop through State street. The loop at the City Hall Park will serve the double purpose of making a close connection with the terminus of the Brooklyn Bridge railroad and of allowing trains to turn here. It is at once apparent that both of these are important ends. One of the means of facilitating handling the traffic at the busy hours will be to stop and start trains from intermediate points, as is now done by the elevated roads, at Rector street and to some extent at other places on the line. This can be done very neatly in Mr. Worthen's scheme by means of the City Hall loop.

Fig. 6 shows a plan and section of a local and express station on Broadway below Thirty-fourth street. In each case the drawing is cut off to the left of the middle line, showing therefore more than half of both plan and section. It will be observed that the local tracks swing out around the island station platforms, and that the platforms are reached by passing above the local trains and under the sidewalk. In the section the relative positions of the cable trenches are indicated in outline.

Fig. 7 shows standard sections of the construction in Broadway. Here again the cable trenches are shown only in outline. It will be seen that the transverse girders are supported by the middle line of columns and that the ends are carried on sidewalls. Over the transverse girders it is proposed to put a roof of buckle plates, protected from corrosion by coal tar, injected during construction. This roof is 7 ft. 9 in. below the grade of the sidewalk, and it is expected that the subterranean pipes and subways will be entirely undisturbed during the construction.

Fig. 8 shows half sections of local and express stations between Thirty-seventh and Fifty-ninth streets. Here it will be seen the tracks are entirely within the curb line, and at the express station the roof of the tunnel is 12 ft. below street grade to permit access to the island platforms over the tops of the local trains. Elsewhere the roof is 7 ft. 6 in below grade.

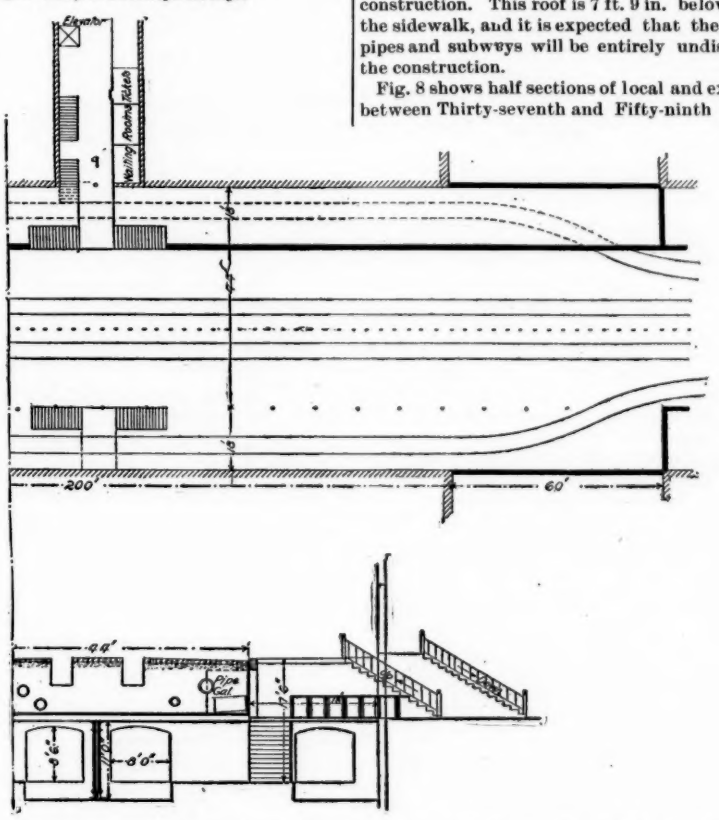
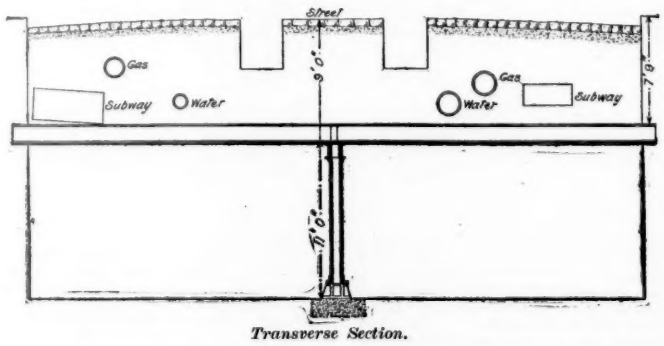
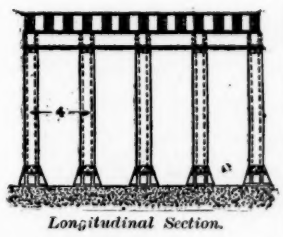


Fig 6—Plan and Section of Local and Express Station on Broadway Below Thirty-fourth Street.

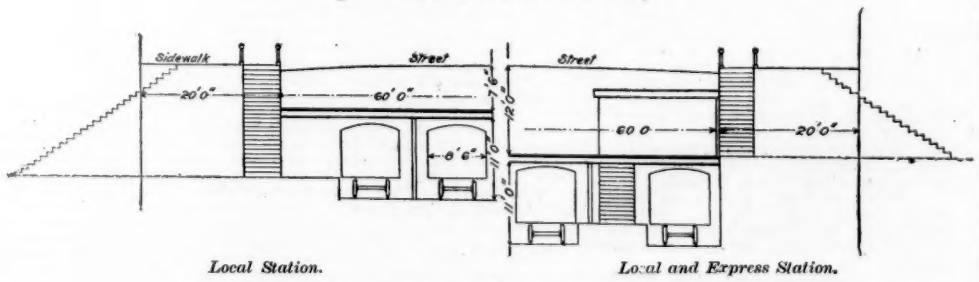


Transverse Section.



Longitudinal Section.

Fig. 7—Standard Section in Broadway.



Local Station. *Local and Express Station.*

Fig. 8—Standard Section Between Thirty-seventh and Fifty ninth Streets.

THE WORTHEN PLAN.

Figs. 9 and 10 show the method of construction of the tunnel. Fig. 9 represents the method of working longitudinally of the street. *EE* represent the needles or horizontal sheet piles which are to be driven forward during the excavation. These are made each of two parallel channels, set on edge, covered by a plate 12 in. × ½ in. riveted on. These needles are to be placed side by side lengthwise of the tunnel. *FF* represent the guide which supports the forward ends of *EE*. This is a steel or iron plate lying nearly horizontal, extending in one or two pieces nearly across the tunnel, having at intervals of 12 in. upright I-beams 15 in. deep. These are directly below the channel beams forming the needles. The rear end of the upper flange of each of these members is to be provided with a set screw to adjust the inclination of *F*. The rear ends of *EE* will be supported by struts *G*, which rest upon sills and which are capped by a box girder *H*. The pressure of the sill is distributed on the earth by planks laid close together.

The needles *E* are driven forward longitudinally, closely followed by *F*. The material included in their cells is dug out, and sufficient material is left to form a support for *F* at all times. These needles are driven 13 in. at each step, and the supports follow them up. Preceding each movement one roof beam and plate will be put in place under the projecting ends of the cover plates of the needles, which project to the rear beyond the channels sufficiently to lap on the last roof plate.

Fig. 10 represents the construction transversely of the street from the vaults. It is assumed that there is no wall under the curb when the work is commenced. In this case the first operation would be to dig a trench in the carriage way, of a depth sufficient to reach the level of the roof of the tunnel, and the trench will be sheeted up on the side toward the carriage way; then excavate under the sidewalk to the building line to a depth of 4

ft. below the roof of the tunnel, supporting the sidewalk on iron beams. Then needles will be driven out under the carriage way as previously described. Directly under the curb is to be placed a girder, shown at *F*, composed of two 12-in. channels. Over this girder the needles will be driven. This plan can be worked simultaneously from both sides of the street, and in this way successive trenches will be cut across the street.

The next operation will be to excavate the trench under *F* and in it place the pedestal and column *C*. The next operation will be to construct a shield *D* against the bank with which to excavate for placing the columns

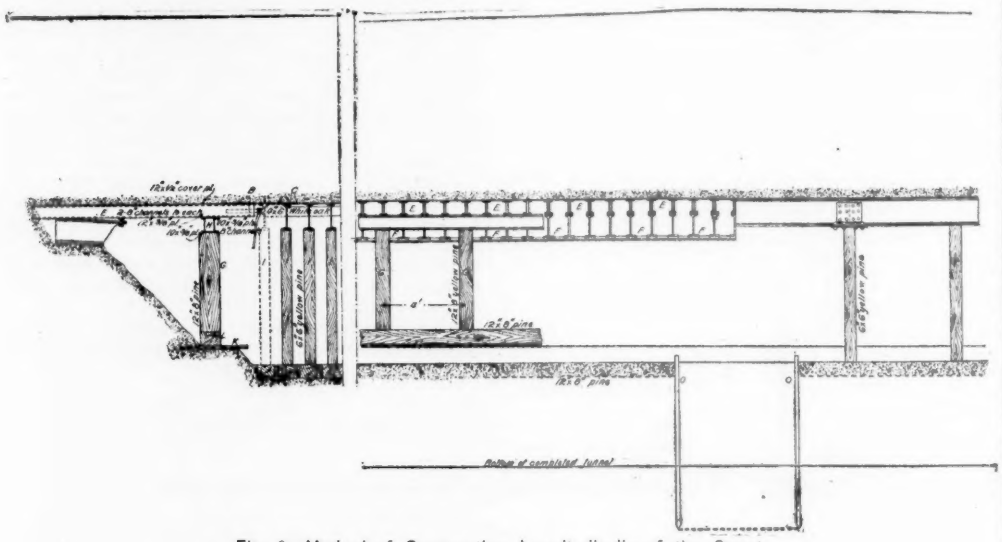


Fig. 9—Method of Construction Longitudinally of the Street.

B with their cover plates under the ends of the roof beams. *D* is shown by dotted lines and consists of two parallel vertical plates with horizontal plates between them. One of the vertical plates is against the wall of earth toward the middle of the street, its upper end extending up outside the ends of the roof beams to the level of the cover plate. The other vertical side plate extends to the underside of the roof beams. The lower end of the shield is below the level of the bottom of the tunnel. This shield is to be forced lengthwise of the tunnel and the posts *B* with their cover plate to be inserted as rapidly as the shield advances. These posts will have to be temporarily shored to sustain the roof.

The next operation will be to excavate a trench to below the foundation wall *H*, after which the tunnel can be completed. A retaining wall will be built at *I*. In case there is already a vault under the sidewalk it will be necessary to dig through its wall at the level of the roof plates of the tunnel and drive the needles under it. In that case the inclined shores *E* will be necessary.

Air Brake Trials in New South Wales.

Last April the Railway Commissioners of New South Wales instructed a board of experts to investigate and report upon the Westinghouse and the Vacuum automatic qnick acting brakes for freight service. The trials were made and the report of the Board was submitted June 29. We are now able to lay before our readers the report of the majority and Mr. Neale's minority report at considerable length, but have omitted, for want of space, a good deal that would have been pertinent and interesting. Later we shall discuss some of the results and conclusions. The upshot of the whole matter is that the Westinghouse brake is adopted for 5,000 vehicles, to be equipped within two years; 1,250 more will be piped. The reports follow:

Each company supplied their patented parts for 50 goods wagons and two engines, and with these trains we carried out a series of experiments between Eveleigh and Katoomba. . . . In framing the conditions the Board had in view the necessity for exhaustively testing the Westinghouse brake on long continuous downward grades, and the effect on the Vacuum brake in ascending long continuous grades, as well as the condition of the brake blocks for everyday working.

(3) It was found necessary, on account of the exigencies of the railway service, to somewhat vary the printed programme, but the Board made every endeavor to meet the wishes of the competing companies, in order to bring out the merits or defects of the respective systems.

(4) We commenced our experimental work on May 31, with emergency stops, on three portions of the road between St. Mary's and the Lapstone Zig Zag. Posts were erected at measured distances, from which the distance run after the brakes were applied could be correctly ascertained.

One set of posts was erected on a level 950 yds. long, at 30¼ miles from Sydney, between St. Mary's and Penrith. Another set was erected on the level at Emu Plains Station, and the third set on the 1 in 30 grade, at a straight piece of road near the foot of the Lapstone Zig Zag. Eighteen emergency stops in all were made at these places, and the results obtained are given in table I.

(5) The speed of the train at the instant of the application of the brakes was determined by means of electrical contacts, a chronometer, and a recorder. The contacts were arranged to determine the times taken by the train to pass over four measured distances extending up to the signal posts where the brakes were applied, a detailed description of which is given in *Appendix* E. The times taken to pass over three measured distances were also determined by observers provided with stop-watches on the ground, and in the first truck by noting the explosion of detonators placed at the distances referred to.

(6) From the results obtained by these methods a diagram was prepared, in order to obtain the speed of the train at the instant the brakes were applied. The speeds obtained in this manner have been recorded, and used in calculating the work done by the brakes in stopping the train. The retarding effect, and the distances which would have been traveled if the speed had been 40 miles an hour on a level, and other results, are shown in table I. The time occupied in stopping the train after the application of the brakes given in table I is the average obtained from observers with stop-watches on the engine and on the ground,

(7) Fourteen of the stops were made with pressures which did not exceed the 95 per cent. required by Board's conditions. These have been placed by themselves, and are used in averaging the results obtained from the two brakes.

(8) The other four stops made by the Westinghouse brake, and numbered in the table 16, 25, 26 and 28, are the results of brake forces which exceed the conditions laid down by the Board, and although given in the table they have not been used, on that account, in averaging, as it would be manifestly unfair to the Vacuum Co. to admit them for the purpose of comparison.

(10) It is unfortunate that the Westinghouse Co. exceeded the limit of brake pressures in stops Nos. 16, 25, 26 and 28, because it renders the comparison incomplete, and we are unable to compare stops Nos. 18, 19, 20 and 22 of the Vacuum brake with the corresponding stops by the Westinghouse. Thus we have out of 18 stops secured only five pairs which compare in weight and other features, their numbers being 1 and 7, 2 and 8, 4 and 10, 45 and 46, 56 and 58.

Considering these pairs on the basis of their common denominators, such as the work done by the brake per second in foot-tons, and the distance which would have been traveled at a uniform speed of 40 miles per hour on the level (see columns 9 and 15, table I), it will be seen that there is not a very great difference between the powers of these brakes when considered as train stoppers. Even if we admit the four Westinghouse stops, which we have decided are not entitled to be placed among the others on account of the excessive brake-power used, the Westinghouse brake would have no advantage in respect of power over the Vacuum.

(11) The condition of the rails and weather were so much alike as to give no material advantage to either side. This similarty of results, obtained from the emergency stops, removes one of the usual basis of comparison, and leaves us to consider on other grounds the merits of the apparatus submitted for experiment.

* * *

(12) The automatic action of the brakes was tested by means of a slip coupling, which, when pulled, caused the train to separate and apply the brakes with full power on both portions of the train. Emergency stops were also made by applying the brakes in each train from the guard's van.

(13) In the service stops the Vacuum train, owing to its superior graduating power, brought the train more gently to rest than in the Westinghouse.

(14) The shunting tests were made in accordance with the programme, and the times occupied in carrying them out were 30 min. 6 sec. for the Vacuum train, and 22 min. 12 sec. for the Westinghouse train; but the Board is satisfied that the automatic brakes should not be used in shunting, and we consider the experiments which were made merely indicated the relative smartness of the men engaged in the operations. . . .

(16) The efficiency of the Westinghouse pump and the Vacuum ejector in accumulating and maintaining full brake power with a low boiler pressure was tested in the emergency stops Nos. 45 and 46 in *descending* on the 1 in 30 grade near Emu Plains. Again, in tests Nos. 64 and 66 the boiler pressures were reduced from 140 lb. to 75 lb., *ascending the same gradient*, in order to demonstrate the effect produced by a bad steaming engine on a steep grade, with the result that both brakes maintained their full power, and made emergency stops at the top of the grade. Respecting the Vacuum train running up along inclines with a comparatively low pressure of steam (say 80 lb.), this test proves very conclusively that the lowering of the steam pressures did not effect the power of the Vacuum in the slightest. Any one acquainted with the properties of steam is well aware that there is no difficulty in getting and keeping a good vacuum with 80 lb., or even 60 lb. of steam.

(17) The results of the leakage tests show that sufficient time was given by both tests to permit guards to secure all hand brakes, but the tests indicate that the brake power leaked off quicker in some of the Westinghouse vehicles that in those of the Vacuum train.

(18) Experiments 49 and 50 were made in a siding at Eveleigh, with the results that the pressure in the Westinghouse train-pipe fell from 66 lb. to 46 lb. in one hour, and the Vacuum from 20¼ in. to 6¼ in. in the same time. These particular experiments show that when the brakes are not applied the leakage from the train pipe and reservoirs is greater than the Vacuum apparatus than with that of the Westinghouse.

(19) The time taken to accumulate the brake power in trains consisting of 48 trucks and one brake van was tested in the Westinghouse train, first with all the reservoirs (including main reservoir) in the train empty, and secondly with the main reservoir charged to 90 lb. pressure, and the auxiliary reservoirs empty. In the former case the time occupied was 10 min. and 51 sec. in the van (up to 65 lb. pressure) and in the latter 8 min. 2½ sec. in the van to the same pressure. The Vacuum train was fully charged in 2 min. and 48 sec., as shown by the gauge in the van.

(20) The time taken to release the brakes and start the trains, after a full application was made at Emu Plains Station, when the trains consisted of 28 trucks each. The Westinghouse train was started in 11.9 sec., and the Vacuum train in 19.5 sec.

(21) The time taken to release the brakes by hand was tested with the same trains at Emu Plains Station, first with the hose coupling separated from the engine in the Westinghouse, so as to represent the effect of a burst hose-pipe and secondly with a reduction of pressure of only 10 lbs. in the train-pipe. In the former test the time occupied was 17 min. and 55 sec., and in the latter 7 min. and 23 sec. In each of these tests the brakes on one truck failed to act. In the Vacuum train the brakes were released by hand in 1 min. and 30 sec.

(22) The times of application of the brakes throughout the whole train, after the movement of the driver's handle, were determined in the Erskineville sidings, both by means of stop-watches and electricity, the results of which are recorded in *Appendix* I, but the Board discovered that before the electric tests were

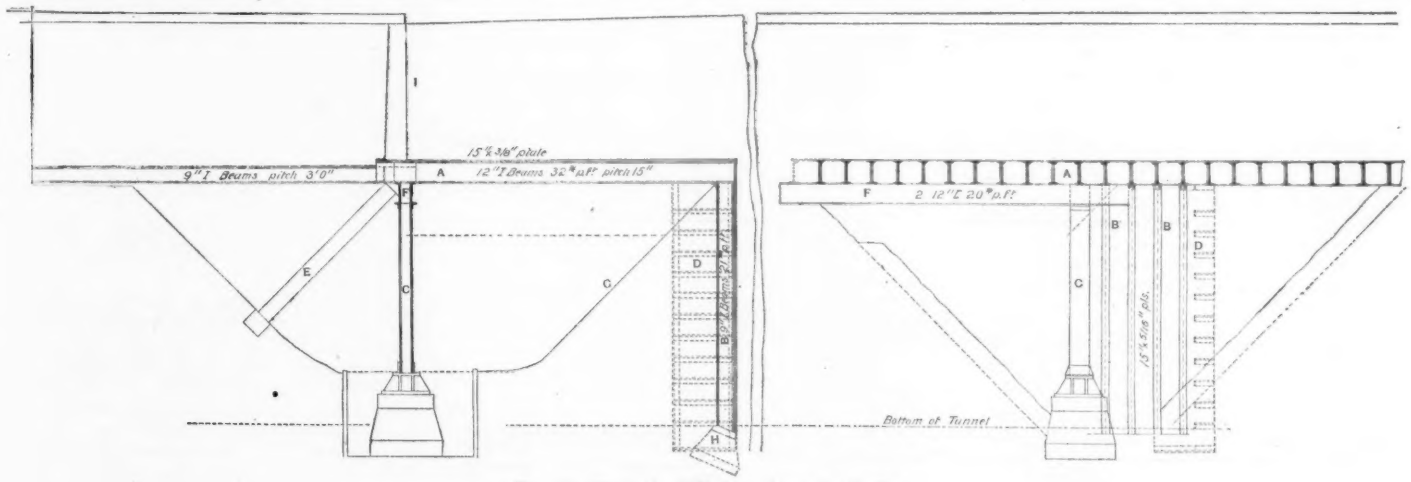


Fig. 10—Method of Working from the Vaults.

THE WORTHEN PLAN.

made a number of the blocks in the Westinghouse train were placed so close to the wheels that the pistons in the corresponding brake cylinders had not sufficient travel to close the leakage grooves, consequently the brakes would have leaked off in practical working; therefore we consider these particular tests are of no corresponding value.

(23) The efficiency of the brakes in controlling a train on long steep grades was tested. . . .

(24) In the descent of the loaded Vacuum train it is important to note that when coming from Katoomba to Glenbrook the brakes on 12 of the 35 trucks were found to be cold at the latter station, although half the maximum brake pressure had been applied at various times in a distance of 26 miles; this may be due to the reason given by the Company's agent, viz.:—"That in fitting up the train a number of the rubber rolling rings had been rendered comparatively useless for graduating, through some of the railway mechanics inadvertently oiling the brake cylinders." This opinion is corroborated by the fact that in an emergency stop made a few minutes afterward, it was found that all the blocks were fully applied.

(25) We are convinced that for a service such as obtains with the merchandise and live stock traffic of these railways, the most successful continuous brake, other things being equal, will be that which is simplest in its mechanism, not easily deranged, not likely to clog in its machinery through exposure to heat and dust, not likely to fail through want of frequent supervision and attention, and not likely to require frequent repairs. . . . We have seen the capabilities of both these brakes in working heavy trains down the mountain road between Katoomba and Glenbrook, and where they were subjected to severe tests. Although this part of the road, in its general character, is a steep incline, it is not a uniform descent, and in a few places the grades change rapidly from a descending to an ascending direction, which, with the constantly varying grade from 1 in 33 to 1 in 66 and easier inclines, require a variation of retarding power, which can only be sufficiently met by a perfect graduation, both on or off, so that a uniform speed can be approached.

(26) In the graduation tests from Katoomba to Emu Plains the Vacuum had a decided advantage, because the principles of its working insure perfect graduation, both in putting brakes on and taking them off. This was clearly shown in coming down steep grades with empty and loaded trains, and this conclusion is clearly demonstrated by the diagrams, which show in a very marked degree the superiority of the Vacuum graduation.

(27) Owing to the greater simplicity in construction and fewness of its working parts, the Board is of opinion that in maintenance the Vacuum brake is the most economical. On every wagon fitted with the Westinghouse brake there are three cocks, and when coupling or uncoupling takes place two of these cocks are always used, so as to distribute or retain the pressure in the train-pipe, or to prevent the brakes being applied. The Vacuum Brake Company claim it as one of the points of superiority in their apparatus that no risk is run from cocks being turned in the wrong direction; and when it is pointed out that in a train of 50 vehicles, fitted with the Westinghouse gear, there are no less than 150 cocks, it will, we think, be readily seen that at country stations, where unskilled men have to couple and uncouple trains, a considerable amount of risk may be expected to arise from the misuse of these details.

(29) Respecting the exhaustion theory, the test on the long incline, viz., from Katoomba to Emu Plains, showed that with ordinary care the Westinghouse brake is practically safe and reliable on steep grades.

(30) In conclusion, we are of opinion that in the experiments now completed the merits of each brake have been exhaustively tested under the conditions laid down by the Board. Both brakes are highly ingenious, efficient and reliable appliances for the purpose intended, and from the evidence before us we consider that in the Vacuum the superiority in graduating, simplicity in construction, and probably economy in maintainance, render it well suited for the goods stock of the New South Wales railways.

Signed,
- WM. CRUICKSHANK, M. I. M. E., *Chairman, Chief Engineer Surveyor Marine Board, Sydney.*
- T. F. ROTHERAM, *M. Inst. C. E., Loco. Supt. N. Z. Railways.*
- W. H. WARREN, *Wh. Sc., M. Inst. C. E., Challis Professor of Engineering, University of Sydney.*
- W. THOW, MEM. INST., C. E., *Chief Mechanical Engineer, New South Wales railways.*
- D. H. NEALE, *Assoc. Memb. Inst. C. E., Assoc. M. C. B. Assoc.* (Subject to dissent recorded below.)

MINORITY REPORT.

I dissent from the foregoing report as regards paragraphs 3, 8, the last clause of 9, 10, 13, the last clause of 14, the last clause of 22, and paragraphs 26 and 30. I also desire to supply certain omissions in the report of the other members of the Board.

Neither train, in my opinion, is now fitted for practical work on goods stock, for the simple reason that couplings were continually fractured. It is of greater practical importance to us to ascertain if this can be prevented than to know which of two brakes gave the best performance in the trials. The Vacuum Brake Co. have made no suggestion as to how these breakages can be prevented. The Westinghouse Brake Co. pointed out that, owing to a miscalculation in their engine leverage, their brake was not working to advantage, and asked to be allowed to remedy this defect. This was refused by a majority of the Board—a fact which I regret, as this alteration would, I believe, have prevented all broken couplings with their brake. The engine and tender, as run, would only tend to stop in about double the distance taken by the trucks when empty, and this threw a very considerable strain on the couplings, and, in my opinion, was the cause of their fracture. A similar state of things existed with the vacuum brake, but the deficiency in the brake power in the engine was not so great, and had it been materially increased the front part of the train, owing to the slower action of the brake, would have come to a stand before the bind part, thus causing shock, which shock was actually felt in two of the emergency and one of the service stops. The vacuum brake, therefore, by increasing the power on the engine would increase the shock. The Westinghouse brake, being too quick to have a shock, the brakes acting in succession on the vehicles quicker than a shock could travel, could have increased the brake power on the engine very materially, and thus lessened the strain on the couplings without any fear of shock.

The results of the various tests are summarized below, the numbers referring to those on page 1 of the conditions under which the trials were made:

(1) Stopping power in an emergency—A train of 48 wagons, loaded and empty, can be stopped by either continuous brake on the level in about one fourth the distance taken by hand brakes.

. . . The only serious case of skidding occurred during one of the hand-brake stops, showing that continuous brakes really lessen the wear of tires.

The emergency stops of the continuous brakes were, unfortunately, not made under precisely similar conditions. The vacuum brake used pressures in excess of their declared maximum in working, and made no trials with brake blocks at a distance from the wheels sufficient to represent the effects of wear. The Westinghouse, except in one stop made to disprove the exhaustion theory, used a lower pressure than is usual on our lines, and made several stops with slack brake locks. The error in the engine leverage increased the length of stop about nine per cent. in trains of 48 wagons drawn by two engines, and about five per cent. when drawn by one engine. With shorter trains the distance would be further increased.

In order to stop a long train in the shortest possible distance a brake must have three essential qualifications: (1) Quickness of application; (2) ample power always available, and (3) sufficient range of action to take up the wear of brake blocks. The electrical tests showed that the Westinghouse brake was fully on in the last truck before the Vacuum had begun to act there. The relative superiority on the other points is obvious, and therefore in actual working the Westinghouse would stop in less distance than its rival, though in these trials the difference, though slight, was in favor of the Vacuum.

The electrical tests for ascertaining the rapidity of application, though confirming the stop watches, were objected to, as some of the brake blocks on the Westinghouse train were by some error too close to the wheels to be effective when the brake was lightly applied. This would, however, slightly diminish the rapidity of application, and therefore tell against the brake. The average distance of the blocks from the wheels was throughout the trials greater in the Westinghouse than in the Vacuum train.

Both trains were worked with a somewhat excessive amount of brake block pressure on the wagons. In the Vacuum this was due to the use of a higher vacuum than is usual or can be relied on in actual working. In the Westinghouse the brake cylinders on the wagons were of unnecessary capacity, as each brake block could be moved nearly 2½ in.—a greater distance than would ever be required. The substitution of 6-in. for 8-in. cylinders, and the use of a slightly higher pressure (say 70 lb.) in the train pipe, would give ample power and range of action, diminish the cost and weight of the brake, and lessen the strain on the drawgear. It would also be more convenient in working mixed trains, as the train pipe pressure proposed would be about that used now in passenger service.

(2) The efficiency of the brake when the brake blocks are worn was insufficiently tried, but it is virtually acknowledged that the power of the Vacuum brake is diminished.

(4) Graduating power in making ordinary stops and running down long inclines—There is little difference in this respect. The Westinghouse stops, owing to its quicker action throughout the train, were smoother than the Vacuum, but except in one case the shock with the latter was not excessive.

(5) The amount of shock, as shown by the slidometer, though not recorded by the majority of the Board, as taken by me, shows a superiority for the Westinghouse brake, both in running down a long incline, in making ordinary stations stops, and in emergency stops. In two of the latter, with empty vehicles, the cast iron weight in the van of the Vacuum train was thrown 8 ft. 9 in. in one case, striking the end of the van, and 6 ft. 1 in. in another case. The greatest movement during the Westinghouse stops was 9 in. The Vacuum brake, therefore, occasionally gives shocks sufficient to throw down cattle and injure vehicles, any movement over 1 ft. being objectionable.

(6) The time taken to release brakes and start train—This test was materially in favor of the Westinghouse, the use of the triple valve enabling the brakes to be applied and released with far greater rapidity than in any pneumatic brake which dispenses with a triple valve or its equivalent. The importance of saving time in railway working is obvious, and amounts to a large pecuniary saving.

(7) The time in shunting with the Westinghouse was 75 per cent. of that taken by the Vacuum. I differ with the other members of the Board who believe that this was due to the men, for it is fully accounted for by the different manner in which the brakes have to be manipulated. Owing to the absence of cocks in the Vacuum train-pipe, directly a vehicle is detached from the engine, the brakes have to be released by hand on the whole of the train, and cannot be used in shunting. With the Westinghouse, by merely turning a tap the wagon can be handled, and, if necessary, controlled by letting some air escape from the pipe by turning the tap used in coupling, and so applying the brake. In this test releasing the brakes by hand lost at least four minutes. As we run 1,687,000 miles shunting per annum, which takes 422,000 hours, a saving of anything like 25 per cent. in this time would amount to at least £20,000 per annum.

(8) Both brakes proved to be efficient with a low boiler pressure, although the Westinghouse brake was worked at a higher pressure than used in the trials, while the Vacuum brake only attained a lower pressure than in the majority of the trials.

(9) The tests as to leakage showed that after standing for an hour the power of the Westinghouse brake was not materially impaired, while that of the Vacuum brake was completely destroyed. This test is of importance, as showing that, even in a new train, leakage, and consequently consumption of steam, is far greater in the Vacuum than with the Westinghouse brake. The leakage tests with the brakes on was unfortunately not sufficiently prolonged with the Vacuum train to form a fair comparison.

(10) Weight of brake shows a considerable advantage to the Westinghouse, the Vacuum brake exceeding it in weight by 152 lbs., or 17 per cent. This difference would be further increased were a smaller sized Westinghouse apparatus used on the wagons, which would be amply sufficient.

(11) The time taken to supply a number of empty trucks with full brake pressure is greater on the Westinghouse than on the Vacuum, the Westinghouse being charged to 50 lbs. in 5 minutes, and the Vacuum to 18 in. in 2 minutes 26 seconds. These pressures may be regarded as minimum working pressures at which the brake is efficient.

(12) The time taken to release the brakes by hand in a siding is also considerably in favor of the Vacuum; but while it is nearly invariably required to be done with the Vacuum brake when vehicles are detached from the engine, it is not required to be done with the Westinghouse, except when the brakes have been applied after the engine has been detached, a thing which cannot be done with the Vacuum brake.

(13) The brakes on one vehicle in the middle of the train being disabled, the vehicle to be made ready for transit without disturbing the train or shunting it off.—This can be done in a few seconds by the Westinghouse brake, by simply turning a tap. In the Vacuum brake it can be done if any part of the brake levers is disabled; but even then the guard requires a "pin punch" and a hammer, and as the guard is not usually in possession of these implements in actual practice, delay would inevitably result. Should a "breakdown" be in the patent parts of the brake, a rolling ring stick or release valve clog by grit, the test did not show if it was possible to throw the brake out of working without shunting the disabled vehicle.

While cocks require care and intelligence in working, they are of very great practical convenience in such cases, and though it is perfectly possible to work the Westinghouse brake without any cocks, the inconvenience of so doing would be as apparent as in the Vacuum brake.

The Westinghouse brake sucking in air at only one point (the pump) is little affected by dust and grit, and the mere fact of its working in some of the hottest and dustiest countries in the world without the slightest inconvenience, shows that dust and grit have practically no effect on it, while they affect the Vacuum even in the moist climate of England. The triple and quick-acting valves under the wagons are, moreover, strongly made, and are actuated by such strong forces that any dust or grit is pushed on one side and cannot impede their action. With the Vacuum brake air is constantly sucked in at all leaks and at every uncoupling, and on an emergency stop rushes in at every wagon. Though the present valve may be improved, it yet remains to be proved whether the modification will not so diminish the rapidity of the brake that shocks become of constant occurrence instead of occurring only occasionally as at present. The small ball valves, though apparently simple, are pressed to to their seats by such a small amount of force that dust cannot be crushed, and small particles of foreign matter may easily prevent the action, and destroy the power of the brake.

The trials down the long incline showed that the Westinghouse brake at the foot had considerably more power than at the summit, and as the auxiliary reservoirs can be recharged in a few seconds, after the brake has been released, I cannot see how any driver of ordinary intelligence could exhaust the Westinghouse brake, a feat which appears difficult, if not impossible, in the hands of a skilful man who is endeavoring to do it. With the Vacuum brake the case is far otherwise. On descending the (Katoomba) incline, the brake, though skillfully handled, was found at the foot (Glenbrook) to have not been acting for some considerable time—or, in other words, exhausted and inefficient—on ten of the rear twenty wagons, and on two out of the front fifteen wagons. No explanation was offered by the representatives of the Vacuum brake, except that oil had fallen on some of the cylinders when in the shops, and that consequently the rubber rings had slipped up and allowed the vacuum to be destroyed. I find, however, that all oil in these cylinders was removed by "benzine," that nearly all the rubber rings were renewed, and that out of these particular ten cylinders which were found not to have acted in running down the incline, all but one had, when tested in the shops, given an excellent result, and proved completely tight. One gave only a fair result. I am, therefore, driven to the conclusion that the oil in the cylinders had no effect whatever on the exhaustion, and that either the power leaked away in the one and a half hours' run from Katoomba, or that the graduating power of the Vacuum brake is so defective in the rear part of the train that the movement of air to apply the brake was so slow in the rear of the train that it could not move the ball valves, and consequently that the air, which was intended to reach one side of the piston only, passed the ball valve, and reached the other side of the piston also, thus putting it in equilibrium, and thereby taking off the brake, and leaving it in the condition in which it was found at Glenbrook. When one-third of the brakes of a train are found to be inoperative after descending 3,000 ft. on long grades of 1 in 33, something is radically the matter, and it is very significant that the Vacuum company's agent asked for no further trial, and did not ask that the cylinders should be examined that afternoon on reaching Penrith, in order to show that this performance of the brake was something abnormal. The conclusion is obvious that this exhaustion *is* normal.

The fact that the Westinghouse quick-acting brake is essentially suited for good trains, and for long gradients and sharp curves, is shown by the fact that it is the only automatic brake used on goods trains (with insignificant exceptions) in the world; and, secondly, that on the railways in the most mountainous part of the United States, with longer and steeper inclines than ours, aggregating 28,127 miles in length, 66,700 freight cars, out of 98,831, were equipped with the Westinghouse brake upward of a year ago, and that it is now being applied to over 50,000 wagons per annum.

The quick-acting Vacuum, while in working order two and a half years ago, is not yet in practical working on any railway.

While the Westinghouse brake requires periodical oiling and examination, it is not so liable to fail on the vehicles as the Vacuum. This is clearly shown by the Board of Trade returns, where the failures on vehicles, apart from hose pipes, are seven times as numerous as with the Westinghouse. Frequent failure of a Westinghouse hose pipe appears peculiar to England, and is probably caused by the climate, as it does not appear elsewhere. The main parts of the Westinghouse brake—the piston, cylinder, triple valve and reservoir—give little trouble, and require little repair, and the cost of their maintenance is undoubtedly low. Statistics show that the pump of the engine is but little more liable to fail than the ejector on the Vacuum. Experiments here show that the friction of the Vacuum rolling ring is 10 per cent. of the total pressure on the piston, thus conclusively proving that it does not roll under pressure, and so accounts for its wear and frequent displacement. While the current of air from the Westinghouse pump conveys oil to all parts of the apparatus automatically, the Vacuum brake cannot be oiled, and therefore its inventors are obliged to use a piston packing which is

TABLE I.—Emergency Stops.

No. tests.	Initial of brake.	Description of train and load.	Weight of train and load stopped by brake.	Speed in miles per hour when brake was applied.	Speed in feet per second when the brake was applied.	Time occupied in stopping the train, in seconds.	Distance traveled by the train after brake was applied—in feet.	Total work done by the brake: in foot—tons.	Work done by the brake per second; in foot—tons.	Percentage of retardation on the whole train.	Total retardation.	Braked weight.	Percentage of retardation on the braked weight of the train.	Distance which would have been traveled, on a level, at 40 miles per hour.	Pressures. Inches. Train pipe.	Inches. Cylinder.	Pounds. Train pipe.	Pounds. Cylinder.	Whether on a grade or level.	Remarks.
1	V	One engine and tender, 39 empty trucks, 1 van	286	29.00	42.5	9.9	291.00	8,049	813	9.6⅛	27.6	279	9.89	553.8	20.5	17	.....	.....	Level.	Train parted. (See breakages.
7	W	One engine and tender, 39 empty trucks, 1 van	286	35.2	51.6	13.7	445.0	11,824	863	9.30	26.6	279	9.53	574.6	.....	.....	55	50	Level.	" "
2	V	One engine and tender, 48 empty trucks, 1 van	332	31.74	46.3	10.87	324.25	11,051	1.016	10.38	34.5	325	10.61	514.4	22	21½	.....	.....	Level.	" "
8	W	One engine and tender, 48 empty trucks, 1 van	332	37.0	54.2	13.6	431.0	15,144	1,113	10 61	35.2	325	10.83	503.6	.....	.....	52	47½	Level.	" "
4	V	One engine and tender, 47 trucks and van	327	33.3	48.8	12.0	355.91	12,110	1,009	10.41	34.0	320	10.62	513.3	19¾	18½	.....	.....	Level.	" "
10	W	One engine and tender, 47 trucks and van	327	31.9	46.8	13.25	380.17	11,120	839	8.94	29.2	330	9.12	597.7	.....	.....	52½	47½	Level.	" "
18	V	One engine and tender, 20 partly loaded trucks, 1 van	261	39.5	57.9	22.75	769.08	13,600	598	10.11	26.4	182	14.51	528.6	22	19	.....	.....	1 in 30 G...	
19	V	One engine and tender, 27 partly loaded trucks, 1 van	317	36.85	54.0	16.00	515.75	14,364	897	8.79	27.9	218	12.80	607.9	21	17¼	.....	.....	Level. ..	Train parted.
45	V	One engine and tender, 27 partly loaded trucks, 1 van	261	32.0	46.9	17.8	530.41	8,915	501	9.77	25.5	218	11.70	547.0	19½	16	.....	.....	1 in 30 G...	
46	W	One engine and tender, 27 partly loaded trucks, 1 van	258	22.5	32.9	12.5	232.0	4,336	347	10.62	27.40	218	12.57	503.2	.....	.....	60	50	1 in 30 G...	30 lbs. in brake cylinder before post was reached where the brakes ought to have been applied.
58	V	One engine and tender, 20 trucks fully loaded, 1 van	301	36.9	54.1	25.0	811.83	13,680	547	8.03	26.9	182	14.78	598.4	22	19	.....	.....	1 in 30 G...	
56	W	One engine and tender, 20 trucks fully loaded, 1 van	303	32.4	47.5	26.4	727.00	10.620	402	8.14	24.7	182	13.57	656.5	.....	.....	65	50	1 in 30 G...	
20	V	Two engines and tenders, 48 trucks partially and fully loaded, 1 van	581	36.55	53.5	17.9	592.0	25,822	1,442	7.53	43.6	387	11.27	709.7	20½	17¼	.....	.....	Level. ...	
22	V	Two engines and tenders, 48 trucks partially and fully loaded, 1 van	581	36.4	53.1	17.0	566.0	25,438	1,496	7.82	45.4	387	11.73	683 3	21½	18¼	... ..	.....	Level.	

Emergency Stops made with brake pressure exceeding 95 per cent. of the weight of the empty truck.

16	W	One engine and tender, 20 trucks partly loaded, 1 van	258	23.92	35.1	12.60	297.0	4,930	387	9.76	25.18	182	13.83	547.5	.....	.....	70	60	1 in 30 G...	22 lbs. in brake cylinder before the post was reached where the brakes ought to have been applied.
25	W	One engine and tender, 27 trucks partly loaded, 1 van	319	37.40	54.8	16.70	554.6	14,875	890	8.42	26.9	218	12.33	634.7	.....	.....	68	57	Level	
26	W	Two engines and tenders, 43 trucks partially and fully loaded, 1 van	589	47.00	68.9	22.5	857.0	43,418	1,973	8.61	50.7	387	13.10	620.6	.....	.....	68	55	Level	Train parted. (See breakages.)
28	W	Two engines and tenders, 48 trucks partially and fully loaded, 1 van	589	34.5	50.6	15.60	479.6	23,416	1,501	8 29	48.6	387	12.56	644.6	.....	.....	68	55	Level	" "

Hand-Brake Stops.

29	W	One engine and tender, 48 wagons—mixed, 1 van	522	31.2	45.6	68.6	1777.7	16,854	245.6	1.82	9.5	325	.....	2936.3	.....	.....	.....	.....	.....	These results show the advantage of the continuous brakes over the hand-brakes. Comparing the average percentage of retardation obtained with the average of Nos. 20, 22, 26, and 28, we have the ratio $\frac{1.6}{8.6}$ or $\frac{1}{5}$ *i. e.*, the continuous brakes are five times as efficient as the hand brakes.
23	V	One engine and tender, 48 wagons—mixed, 1 van	515	25.2	36.8	65.4	1422.5	10,830	165.6	1.48	7 6	325	.. ...	3610.8	.....	....	.....	.....	.....	

hardly known in other machinery, but is supposed to be the only packing that can stand the absence of lubrication. I am, therefore, of opinion that, while the cost of maintenance is low with both brakes, it is in favor of that which is at once lubricated and protected from dust, while experience in England and elsewhere show that, with long trains, the consumption of fuel would also be greatly in favor of the Westinghouse brake.

The pecuniary saving in increased speed of trains, the diminished time occupied in shunting, and the diminution of skidded wheels, would probably far outbalance not only the cost of maintenance, but in a few years the cost of the brake itself. While the simplicity of the Vacuum brake is obvious, and the complexity of the Westinghouse appears objectionable, simplicity may be dearly bought at the expense of certainty of action, and the quicker application and release of the Westinghouse, its greater convenience in shunting, and detaching disabled vehicles, with its far greater command of power, its diminished weight, and its greater range of motion to take up the wear of brake blocks and tires, far outweigh any supposed advantages due to simplicity.

D. H. Neale.

APPENDIX E.—SPEED OF TRAINS AT EMERGENCY STOPS, AS RECORDED BY CHRONOGRAPH.

Date.	Westinghouse or vacuum.	No. of test.	Distance in feet.	Time in seconds.	Speed in miles per hour.
1891.					
7 June	W.	16	440	11.0	27.27
7 "	W.	16	440	11.5	26.08
7 "	W.	16	220	6.05 *	24.79
7 "	W.	16	220	7.5	20.0
7 "	W.	46	440	9.35	32.08
7 "	W.	46	440	10.10	29.70
7 "	W.	46	220	5.75	26.08
7 "	W.	46	220	6.55	22.9
8* "	V.	18	440	11.5	26.08
8 "	V.	45	440	13.0	23.07
8 "	V.	45	440	12.20	24.58
8 "	V.	45	220	5.40	27.7
8 "	V.	45	220	4.95	30.30
8 "	V.	20	440	8.5	35.29
8 "	V.	20	440	8.35	35.92
8 "	V.	20	220	4.25	35.29
8 "	V.	20	220	4 25	35.29
8 "	V.	22	440	8.70	34.48
8 "	V.	22	440	8.65	34.69
8 "	V.	22	220	4.30	34.88
8 "	V.	22	220	4.30	34.88
14 "	W.	56	440	13 15	22.81
14 "	W.	56	440	12.85	23.34
14 "	W.	56	220	5.35	28.0
14 "	W.	56	220	4.85	30.92
14 "	V.	58	440	12.75	25.52
14 "	V.	58	440	10.75	27.9
14 "	V.	58	220	4.75	31.57
14 "	V.	58	220	4 30	31.88

* In this test the three last electrical contacts failed to act, and the speed and times at point of application were not obtained.

APPENDIX A.—General conditions.

2d. The engines selected for working the trains are to be alike and braked. They are to be fitted with brake-blocks on all their coupled wheels, and all the tender wheels are to be braked.

4th. The brake power on the engine is not to exceed 85 per cent. of the weight on the coupled wheels.

5th. The brake power on the tender is not to exceed 95 per cent. of the weigh of the empty tender.

6th. The brake power on the wagons or other vehicles must not exceed 95 per cent. of the weight of the empty vehicles.

7th. The trials shall be made when the vehicles are both empty and loaded to limit.

APPENDIX B.—Conditions of brake trials.

These trials shall be especially directed to test the following points:

1. The stopping power in an emergency on the longest trains at the maximum speeds, especially as compared with hand brake stops.
2. The efficiency of the brake when the parts have become worn, including tests with worn brake shoes.
3. The efficiency of the brake should a coupling part.
4. The graduating power to be tested by making ordinary or service stops, and by letting a train down an incline at a moderate speed.
7. The amount of shock as shown by the slideometer.
6. The time taken to release brakes and start train.
7. The time taken in shunting.
8. The efficiency of the brake with a low pressure boiler.
9. The liability to leakage.
10. The weight of the brake.
11. The time taken to supply a number of empty trucks with full brake pressure.
12. The time taken to release the brakes by hand in a siding.
13. The brakes on one vehicle in the middle of a train being disabled, that vehicle to be made ready for transit without disturbing the train or shunting it off.

APPENDIX I.—TABLE OF TIME TAKEN TO APPLY BRAKES, AS MEASURED BY ELECTRIC CONTACT WITH CHRONOGRAPH.

No. of test.	Westinghouse or vacuum.	Time from "running position" to "full application" of driver's handle.	Time from "full application" of driver's handle to gauge movement on last or 48th wagon.	Time from first movement of gauge on 48th wagon to full pressure.	Total time from "running position" of driver's handle to full pressure recorded on 48th wagon
		Seconds.	Seconds.	Seconds.	Seconds.
1	W.	0.144	1.566	0.633	2 343
2	W.	0.167	1.583	0 583	2 333
3	W.	0.155	1.60	0.55	2.305
1	V.	0.038	2.316	1.033	3.387
2	V.	0.030	2.25	1.066	3.346
3	V.	0 030	2.233	1.05	3.313

Bridging the St. Lawrence at Quebec.

It has for several years been in contemplation by the Canadian Government to bridge the St. Lawrence River at Quebec, but various influences have prevented the final selection of a site. The Chief Engineer of the Government was requested to make a survey for the purpose of ascertaining whether it was possible to build a railroad bridge to span the St. Lawrence near the City of Quebec, by which the Grand Trunk might enter the City of Quebec and the Canadian Pacific and other roads on the north shore of the St. Lawrence River could connect with lines on the south shore.

In the report which has just been presented to the Dominion Government, Mr. Schreiber says: "The site at the Chaudière, as located by Mr. Hoare, the bridge company's engineer, appears unobjectionable. His estimate of the cost at this point is about $4,500,000. His approximate estimate for the bridge at either Point Pizeau or Point Diamond is about double that at the Chaudière, and is not reliable. In either of the last two mentioned cases two piers will stand in the channel to which exception might be taken by the shipping interests. That at Point Diamond strikes me as very objectionable. The proposed site at the Island of Orleans may, I think, fairly be ruled out, as it would undoubtedly be very costly to construct.

"That it is feasible to construct a bridge over the river near Quebec there is no manner of doubt. The minimum cost may be placed at $4,500,000 or $5,000,000, with approaches from the railroads by adopting the Chaudière route. The following figures give a general idea of the magnitude of the proposed works:

"The Chaudière site: Extreme length of bridge, 3,420 ft.; width of river (water edge to water edge), high tide, 2,300 ft.; width of river, low tide, 1,800 ft.; deepest water in channel at low tide, 143 ft.; height above high water, 150 ft.

"Point Pizeau site: Extreme length of bridge, 6,754 ft.; width of river (water edge to water edge) high tide, 5,600 ft., and low tide, 4,000 ft.; deepest water in channel at low tide, 122 ft.; height above high water, 70 ft.

"Island of Orleans site: Width of south channel at high tide, 5,000 ft.; width of north channel at high tide, 8,000 ft.; total, 13,000 ft.; width of south channel at low tide, 4,000 ft.; width of north channel at low tide, 2,000 ft.; total, 6,000 ft.; deepest water south channel at low tide, 92 ft.; deepest water in north channel at low tide, 48 ft.

"I called upon the Board of Trade, with the object of gaining their view as to which site, in the interest of the trade of Quebec, was generally favored, and from all I could learn it was evident all were in favor of the Point Diamond crossing, or some other directly opposite the city. The cost of a structure at any point opposite the city may be placed at a minimum of from $9,000,000 to $10,000,000. Before the location is finally selected it will be necessary to expend a considerable amount of labor in obtaining the fullest possible information of the nature of the bottom of the river at the several points under consideration."

Fast Express Locomotive—Central Railroad of New Jersey.

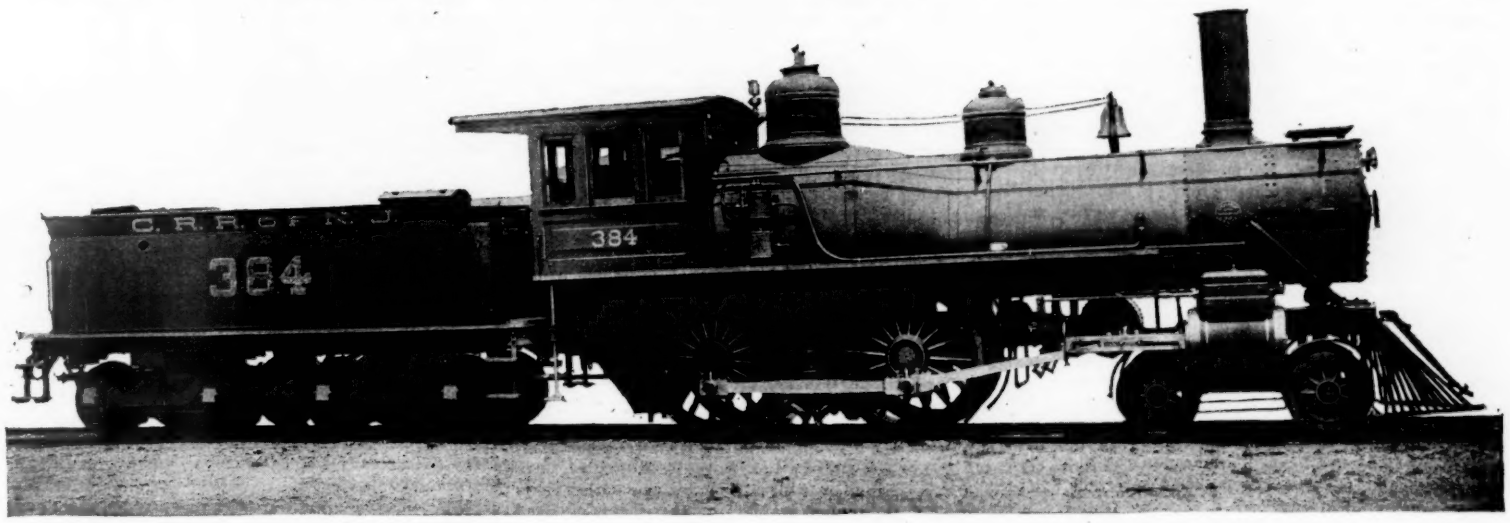
The accompanying illustration shows a handsome eight-wheel express locomotive built by the Cooke Locomotive Works for the Central Railroad of New Jersey. The following are the general dimensions:

Cylinders, 19 × 24 in.
Diameter of drivers, 68 in.; centres, 62 in.
Engine truck wheels, 32 in. diameter.
Tender truck wheels, 36 in. diameter.
Steam ports, 1⅝ × 16 in.
Exhaust ports, 3 × 16 in.
Bridges, 1⅝ in.
Allen-Richardson valves, 5½ in. travel, ⅞ in. outside lap, 1-32 in. inside lap.
Driving axle journals, 8½ in. diameter × 9⅝ in. long.
Engine truck axle journals, 5½ in. diameter × 7⅞ in. long.
Tender truck axle journals, 5 in. diameter × 8 in. long.
Boiler, wagon top, ⅛ in. steel plates.
Firebox for anthracite coal with grate of water tubes and pull bars, 126 in. long, 42⅝ in. wide, 53 in. deep front, 43½ in. deep back.
Tube plate, ½ in. thick; crown, ⅜ in.; sides, 5-16 in.; back, ⅝ in. All Otis steel. Crown bars, 5 × ¾ in.
217 flues 2 in. outside diameter, 11 ft. 9¾ in. long.
Working pressure 160 lbs. per sq. in. Dry pipe wrought iron, 8 in outside diameter.

	Lbs.
Weight on drivers in working order	75,900
" " truck	30,000
Total	105,900
Weight of tender empty	41,000

These engines are similar to others in use on this road, but they have been changed in some details to overcome the trouble with overheated bearings. They are used on the fast run between New York and Philadelphia, where they sometimes run at 75 miles per hour; consequently, all bearings must be perfect. The main driving axles were very carefully selected and the journals increased from 7½ in. × 8½ in. to 8½ in. × 9⅝ in. The boxes were strengthened on the flanges. The connecting rods and main axle journals were fitted with Damascus bronze bearings and well arranged for lubrication.

The firebox mud ring is double riveted at the corners; the tender is fitted with a water scoop and the engine is fitted with Westinghouse automatic air brakes and conductor's signal.



FAST EXPRESS LOCOMOTIVE FOR THE CENTRAL RAILROAD OF NEW JERSEY.
By the COOKE LOCOMOTIVE WORKS, *Paterson, N. J.*

The Interstate Commerce Commission and Its Work.

BY HON. AUGUSTUS SCHOONMAKER, *Formerly Interstate Commerce Commissioner.*

The Interstate Commerce Commission has reached a stage where a reconstruction of its personnel is inevitable. Four of the original commissioners have ceased to be members, two have gone out by resignation, one by expiration of term and one by death. One only remains, and his term will expire at the end of the present year.

The theory of short terms and of political considerations in selection will have a fair test at this early day in the Commission's existence. It was a serious mistake in its organization to subject its personnel to changes for political reasons only. A provision for an even number of commissioners, with a restriction that not more than half should be taken from one political party, would have guarded against this evil. As a political body, or one in which politics is to dominate either in its constitution or its action, it cannot be useful, nor be worth the expense of its maintenance. It may, however, by such means become mischievous and provoke its own abolition. Short terms and the possibility (which practically means certainty) of changes solely for political reasons, are fatal elements of weakness in the Commission. Knowledge and independence are essential to a proper performance of the duties of the office. The requisite knowledge must embrace a general knowledge of legal and equitable principles, of constitutional interpretation, of geographical conditions, and of the channels of commerce; and also special knowledge acquired only by study and experience of railroad conditions, the production of commodities of commerce, with the directions of their movement and the various influences that are potential in controlling, often against the choice of carriers, the classifications and rates under which traffic is moved, together with the distinctions between joint rates and single rates. The necessary independence is only possible with security of tenure of office.

In the provision of the Federal constitution relating to the courts of the United States this feature was wisely foreseen by the framers of that great instrument. What would be the character and usefulness of the Supreme Court of the United States if it were not for the security of tenure of the judges—contingent only on behavior in office—and if they were liable to change with every change in the executive department of the government?

The Commission is scarcely less important in many respects than the Supreme Court. It deals with questions of the highest importance to the business interests of the country. It has judicial as well as administrative functions. It must decide mixed questions of law and fact, requiring for their proper determination expert knowledge. Principles of transportation have to be declared and rules of conduct to be enforced. Rectitude of character, impartiality of purpose and competency for the task are of supreme importance. But unless these are fortified by the independence of action afforded by security of tenure, are they, as human nature is constituted, sufficient? Is the full measure of a man's usefulness possible unless he can feel, by reason of his independence of position, that he can afford to do right because it is right? And is it best for the country, or just to public servants, that fitness and fidelity in non-political positions afford us no protection against partisan changes?

The Commission has passed its first stage, and in the transition now at hand the original body and the policy of creating a Commission are to be judged by its work. The course pursued by the Commission in its official conduct was not what the framers of the act had in view, though strictly within the terms of the statute. It was expected that the Commission would be largely an itinerant detective body, going about the country to discover violations of law and to institute prosecutions in the courts. This, as the chief function of the Commission, would have rendered it obnoxious everywhere and probably broken it down in a year. The commission soon saw that its administrative and judicial work, together with the statistical duties devolved upon it, would furnish it all it could do, and that complaints for infractions of law might be left to be preferred by those interested, instead of the commissioners neglecting other duties to search for violations. It quickly found its hands full with the complaints of parties representing every variety of interests among shippers and among railroads themselves, and requiring careful and often extended investigation. The disposition of these cases by the necessary findings of fact and conclusions of law under the act afforded opportunities for the discussion of transportation questions and the principles that should govern the business, the exposure of practices intended to be superseded, and the laying down of rules of conduct. The opportunities thus presented were improved by the Commission with reasonable diligence and as much fullness as was practicable, and the result has been the accumulation of several volumes of transportation literature in which nearly all the leading phases of the subject have been discussed and passed on, and possessing in the main as much value in establishing precedents and declaring sound principles as the initial work of any new department of administration or new tribunal in the field of jurisprudence. Quite likely some mistakes have been made arising from unfamiliarity with the subjects, imperfect presentation of the facts, misapprehension of the statute or other causes. But of one thing there is no doubt, and that is the *bona fide* intention of the Commission to follow the mandates of the statute and to give them effect; to secure to the public the equality, absolute or relative, as the case might be, which is the great aim of the statute as it is the behest of natural justice, and to abate, as far as possible, all unfair and unjust practices falling within their jurisdiction.

The Long and Short Haul Clause.—The first official deliverance of the Commission was the opinion upon the applications for relief by the Southern railroads and many others, under the fourth section of the Act, entitled, *In re* Louisville & Nashville R. R. Co. 1 I. C. C., Rep. 31, prepared with great care by the Chairman, and to a limited extent contributed to by other commissioners. This paper is a treatise upon certain features of transportation, and the interpretations of the statutes and the principles announced in that opinion have ever since been adhered to. The policy of giving preferential rates to selected localities with the view to build up so-called trade centres, or to favored manufacturers or producers to develop business, or the continuance of such rates because once established, were condemned as clearly unlawful. But the chief argument of the opinion was upon the fourth section, its interpretation and application. The interpretation that the initiative is upon carriers in fixing rates under this section, subject to ultimate decision by the Commission regarding their justice and propriety upon complaint made, relieved this section of the severity that had been apprehended and left it a workable provision. And the ruling that the prohibition against charging less for a longer than a shorter distance over the same line applies only when the circumstances and conditions are substantially similar, left the restriction only a very narrow one. The enumeration of dissimilarities that would justify a less charge for a longer distance, such as water competition, the competition of foreign railroads, or railroads not subject to the law, and rare and peculiar cases of competition of railroads subject to the act when a strict application of the rule of the statute would be destructive of legitimate competition, provided that in any of such instances the competition is actual, and of controlling force in respect to traffic important in amount, embraced nearly every class of cases in which an exceptional rate could be justly made, and guarded the making of such rates against abuse. Other safeguards were also added to the effect that the exceptional rate must in no case be unremunerative, that is, not so low as to cast a burden on other traffic, and must bear a reasonably just relation to higher rates at intermediate points on the line, so that no unjust discrimination against other localities served by the carrier results from the reduced charge.

The principles of this decision have been followed in every case in which like questions have arisen. In Harwell vs. Columbus & West Ry. Co., 1. I. C. C. R. I., and in San Bernardino, Board of Trade vs. Atch., Top & Santa Fe R. R., 4 I. C. C. R., the exceptional rate was denied because the facts failed to show the necessary conditions. In Lehman Higginson & Co. vs. Southern Pacific Co. and others, 4 I. C. C. R., in King vs. N. Y., N. H. & H. R. R., 4 I. C. C. R., and in Rice vs. Atch., Top. & Santa Fe R. R., 4 I. C. C. R., the exceptional rate was allowed because the cases were fairly within the rules laid down in the principal case.

Much misconception at first existed with regard to the character of the prohibition in the fourth section, known as the long and short haul clause, and the careless and often passionate utterances of railroad managers indicate that erroneous views on the subject are still entertained. The prohibition is in these words: "That it shall be unlawful for any common carrier subject to the provisions of this act to charge or receive any greater compensation in the aggregate for the transportation of passengers or of like kind of property, under substantially similar circumstances and conditions for a shorter than for a longer distance over the same line, in the same direction, the shorter being included in the longer distance."

Against the plain sense of this carefully worded statute it was supposed by many that the prohibition against the less charge for a longer haul was absolute, unless a permissive order should be made by the Commission. But obviously the language employed will not bear such an interpretation. In the construction of a statute all the language used must be considered, and the intent derived from the whole enactment. The qualifying words are of equal weight and importance with the other clauses, and their office is to explain with precision the legislative will.

The prohibition then, instead of being general and absolute, is limited precisely as described in the statute. It applies where the transportation of passengers or of like kind of property is under substantially similar circumstances and conditions, over the same line and in the same direction, the shorter distance being included in the longer distance. All these conditions must exist or the prohibition has no force. If the property transported is unlike, if the circumstances and conditions are dissimilar and if the longer distance is not in the same direction and does not include the whole of the shorter distance, the prohibition is inapplicable.

The portion of the qualifying clause which is not clearly defined by the act itself, but left to be interpreted by the public authorities or the courts, is contained in the words "under substantially similar circumstances and conditions." No attempt has been made at any time to define all the circumstances and conditions that may create dissimilarities, but particular facts have been considered from time to time as they have been presented in cases before the Commission. There is no limitation upon these dissimilarities. They may be numerous and may vary in different cases. They may relate to the character of a carrier's line of business, or may be wholly extraneous. They must obviously relate in some manner to the compensation of the carrier for its service, and affect its amount by the compulsion of some circumstances which he either cannot control or cannot by reasonable effort obviate.

The essential justice of the long and short haul clause as interpreted and applied by the Commission cannot be successfully impugned. It leaves carriers all the liberty they ought to have—the right to judge for themselves of the necessity of a lower charge for a longer distance, and of the sufficiency of the circumstances to justify it only within such limitations as shall prevent injustice, that is to say, that the justifying facts must be actual and not controllable by the carrier, nor merely theoretical, and that the extent of the reduction must not produce undue prejudice.

The section applied in this liberal manner is only a prohibition of one form of unjust discrimination—a form that is particularly obnoxious and indefensible. Who could be convinced, for example, of the propriety or justice of charging less for a carload of wheat from Dakota to New York than from Ohio to New York, wheat being produced and shipped from both places? So general, indeed, was the public hostility to this kind of discrimination that prior to the act to regulate commerce, beginning as far back as 1850, 17 states had prohibited it, and all except one (Connecticut) without any exception to the rule, and six additional states have since made like enactments.

The principle of the prohibition is therefore not only just in itself, but is fortified by such a weight of public sentiment as expressed in legislation that it must be regarded as settled policy, and any attempt to materially modify it can only be futile. The narration of the adoption of this principle by the states forms as instructive portion of the fourth annual report of the Commission, pp. 37 to 47. An account of the incorporation of this principle in the Act to Regulate Commerce is concisely given in the opinion, *In re* L. & N. R. R. Co., 1 I. C. C., Rep., pp. 74 to 80.

Reasonable Rates.—Another precedent of much public importance established by the Commission and evolved rather from the spirit than the letter of the act, is, that rates made by a carrier must not only be reasonable in themselves, but relatively reasonable, both as regards other points on the same line and on branches and parallel lines operated by the same carrier. This is an important protection against oppression from consolidation and essential to the equal competition of producers in common markets. This principle was early laid down in Board of Trades Union, etc., vs. Chi., Mil. & St. P. R. R., 1 I. C. C. Rep., 215, and has been uniformly followed; Raymond vs. Chi., Mil. & St. P. R. R., 1 I. C. C. R., 230; Crews vs. Rich. & Dan. R. R., 1 I. C. C. R., 401 *In re*, Chi., St. P. & Kan. City Ry. Co., 2 I. C. C. R., 231-265; Manufacturers & Jobbers' Union, &c., vs. Min. & St. L. Ry. Co., 4 I. C. C. R.; Rice Robinson & Winthrop vs. West N. Y. & Penn. R. R. Co., 4 I. C. C. R.

The principle of law is stated in one of the cases as follows: "When a carrier engaged in transportation for which, by reason of competitive conditions or for purposes of its own, it receives low rates from some patrons and at some localities, it accepts the legal obligation to give impartial service to other patrons and at other localities that sustain similar relations to the traffic."

Through and Local Rates.—One of the most important precedents established by the Commission, and which, though it has encountered some opposition, is of the greatest public utility and highly acceptable to the railroads, is the relation of joint through rates to local rates—to wit, that a joint through rate may be less than the sum of the local rates; or, in other words, that the divisions of a through rate accepted by different carriers in a line need not equal the local rates simultaneously charged by each carrier between the termini of its own line. In the legal sense the rule rests upon somewhat strained and technical grounds, but in transportation aspects it is supported by weighty reasons. The reduction of terminal expenses by being shared by the connecting carriers, or distributed over much longer distances, the movement of the traffic in solid trains, and more expeditious trips, with greater likelihood for return loads, are all good transportation reasons for a lower through rate; and if the through rate is barely remunerative, the proportion only of the through rate could not compensate for a short local haul with all the terminal expenses and other incidents of local traffic borne by the same carrier.

The limitation on the extent of the difference between through and local rates is that it must not amount to unjust discrimination, but must be reasonably proportional. The rule established has been applied in a large number of cases. Detroit Board of Trade vs. Fr. Tr. Ry. and others, 2 I. C. C. R., 315; Bus. Men's Asso. of Minn. vs. St. P., Minn. & O. M. Ry. Co., 2 I. C. C. R., 52; Lippman vs. The Cent. Ill. R. Co., 2 I. C. C. R., 584; Chamber of Com. of Mil. vs. Flint & Pere Marq. R. R. Co., 2 I. C. C. R., 553; McMorran vs. Gr. Tk. Ry. Co., 3 I. C. C. R., 252; New Or. Cot. Ex. vs. Ill. Cent. R. R. Co., 4 I. C. C. R., 534; Martin vs. Chic. Bur. & Q. R. R. Co., 2 I. C. C. R., 25.

Group Rates.—Another important precedent for which the Commission is responsible is the recognition of group rates. This, like the preceding precedents, had to be evolved from the principles of the act in the absence of any specific enactment. In England the allowance of group rates was an evolution from pronounced hostility to guarded recognition, until directly authorized by statute in 1888. Group rates of moderate extent were very common in this country when the law took effect, and they have been enlarged and increased in number from year to year. The Commission in advance of the English statute applied substantially the principles of that act, that a common or group rate for an area of territory producing the same commodity and transported to the same markets is not of itself unlawful, but that actual prejudice or damage, of which the rate is cause, must result in the more favorably situated producers to render a group rate unlawful.

The rule was first applied in the Mich. transportation case of Howell vs. N. Y., L. E. & W. R. R. Co., 2 I. C. C. R., 272, to a group over 100 miles in length. Other cases in which it was applied are the Illinois coal case of Read vs. Ch. & Northwest. Ry. Co., 2 I. C. C. 540; Imperial Coal Co. vs. Pitts. & Lake E. R. R. Co., 2 I. C. C. R., 618; a Penn. coal case concerning a group 80 miles in diameter; Rice vs. Atch., To. & Santa Fe R. R. Co. and others, 4 I. C. C. R. In the last named case a so called "blanket rate" for the transportation of petroleum oil from all parts of the United States east of the 97th parallel of longitude to California points was sustained, on the ground that no damage to any one was shown to result from it. The case is an extreme one upon an exceptional state of facts, and is not likely to be regarded as a controlling precedent for any other case or commodity, nor, indeed, to stand long as the rule for the particular commodity.

Export and Import Rates.—The precedents established by the Commission with regard to export traffic from interior points in the United States to foreign countries on through bills and through rates, and on import traffic from foreign countries to interior points in the United States on like bills and rates, received great consideration, and grew out of earnestly contested cases. Doubtless wide differences of opinion still exist on the subject. The decisions rendered were based upon the language of the statute, and the practical impossibility of applying its provisions in respect to the filing and publishing of rate schedules to rates that fluctuate from day to day, as well as on the element of undeniable discrimination against seaboard exporters in the one case and against home goods carried to the interior in competition with import traffic in the other case. The Commission ruled, therefore, that the established inland rail rates to the seaboard must be the basis of foreign export rates, and that the through rates must be made by adding thereto the ocean rates to the foreign destination. This was announced in the case of the N. Y. Prod. Ex. vs. N. Y. C. & H. R. R. Co. and others, 3 I. C. C. R., 137. And conversely the rule in respect to import traffic was declared to be that the traffic must be carried from the seaboard to the interior destination at the established inland tariff rate, and the through rate be made by adding to that the ocean rate. This was announced in the case of the N. Y. Produce Ex. vs. the Penn. R. R. Co. and others, 4 I. C. C. R. The case embraced all the principal roads in the country engaged in the carriage of import traffic. The Commission had made an order to this effect as early as March, 1889, and the trunk lines had substanially complied with the order, but some of the Southwestern and the California lines had disregarded it. The Southern Pacific Company, it is understood, intends to contest the decision of the Commission in the courts.

Oil Rates.—One of the most troublesome questions with which the Commission had to deal was the transportation of petroleum oil. The trouble did not arise from the principle to be applied, but from its practical application and the powerful interests which resisted the rule of equality. The question was between the carriage of oil in tanks and in barrels. The railroads ceased to furnish tank cars and only furnished box cars for barrels. The tank shippers furnished their own equipment and only for their own use. The railroads discriminated in favor of the tank shippers in various ways. They hauled the tank cars free, and paid mileage for their use, loaded and empty. They made a lump charge for the oil hauled in the tanks, which was often only one-half or less the amount charged to barrel shippers. They gave a rebate from the capacity of the tank. The barrel shipper was charged for the barrel as well as the oil, and for the return of empty barrels, and no rebate in quantity allowed. These were the general practices, though there were some exceptions by some roads.

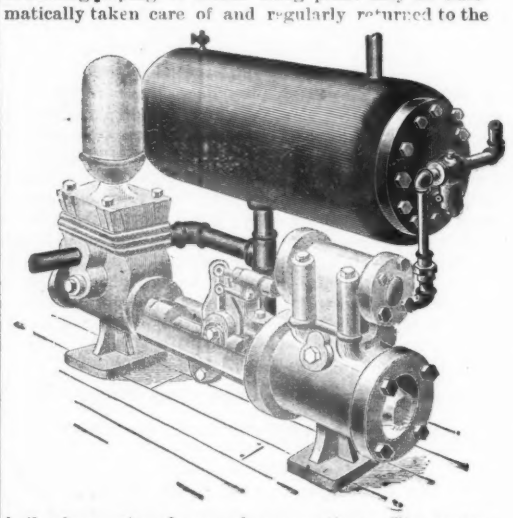
The first case presented was that of Rice vs. the L. & N. R. R. Co. and others, 1 I. C. C. R., 503. The Commission, pursuant to the rule of equality required by the statute, pronounced against the lump charge for oil in tanks, and ordered that the rate should be made by the hundred pounds, both in tanks and in barrels, and ruled that the fact that the carrier in the one case furnished the equipment, and in the other not, could not change its duty in respect to equality of rates, that it was the business of the carrier and not of the shipper to furnish rolling stock. The question of charging for weight of barrels, while not charging for tanks, was not passed on but was tacitly allowed.

The next oil case was Scofield vs. L. S. & Mich. South. Ry. Co., 2 I. C. C. R., 90. This case, while strongly insisting on the rule of equality in rates on the commodity, went no further than the preceding one in respect to barrels.

The third case was Rice, Robinson & Witherop vs. West N. Y. & Penn. R. R. Co., 4 I. C. C. R. This case followed the others so far as they had gone in enforcing equality, and went the additional steps necessary to complete equality by ordering that the rate should be on the commodity only, regardless of the package, whether tank or barrel, in which it might be carried; that if a carrier elected to make no charges for tanks he must make none for barrels, and that no rebate must be made from the capacity of tanks, unless a like rebate was made for barrels.

Combined Tank Governor and Pump.

There is a steady and continuous demand for a reliable combined receiver and boiler feed pump, by means of which the condensed water returns, from any system of heating, drying or steam using plant may be automatically taken care of and regularly returned to the



boiler for continued use and evaporation. The accompanying illustration shows such a device. It is manufactured by the Curtis Regulator Co., of Boston, Mass. The receiver has a removable end or head to which is attached a balanced steam valve operated by an enclosed hollow float and lever. The float is so arranged in its connection with the valve that a constant level of water is maintained within the receiver. The space above the return water being full of steam the water entering the boiler is kept at the highest condensation temperature possible. Admission of steam to operate the connecting pump is controlled by the balanced valve of the receiver and the suction pipe for boiler feed takes its supply from the bottom of the receiver. This pipe projects upwards a short distance above the bottom of tank, so that no dirt, or scale sediment is allowed to pass to the boiler with the water. The pump and receiver are shipped ready connected and in complete condition for attachment to boiler and to condensation discharge nozzle.

American Railway Association.

The fall meeting of the American Railway Association (late the General Time Convention) was held in New York City on Wednesday of this week, 68 representatives being present. Col. H. S. Haines, Vice-President of the Plant Investment Company and President of the Association, presided and delivered an interesting address on the Cost of Transportation, which will be found in another column.

The date agreed upon for the fall change of time is

Nov. 15. The election of members of committees resulted as follows: On Car Service: Wabash, Chicago, Milwaukee & St. Paul; Norfolk & Western. On Safety Appliances: Richmond, Fredericksburg & Potomac; Chicago & Northwestern; Boston, Revere Beach & Lynn. Seven new roads joined the Association. Mr. Willard A. Smith, Director of Transportation Exhibits of the Columbian Exposition, addressed the meeting on the plans and prospects of his work. The meeting passed a resolution expressing approval of and interest in the timber tests that are being conducted by the National Department of Agriculture and commending the work to the favorable consideration of Congress.

The car service committee made a report saying that demurrage associations continue successful and recommending universal adoption of the principles upon which they are based. The committee has had prepared a map showing the territory now covered by car service (demurrage) associations.

The committee on safety appliances has gathered information on continuous heating and on car lighting, but it is not given out for publication. The report embodied a resolution, which was adopted, to the effect that continuous steam heating should be the standard heating system of the Association, and that lighting by high test oil is safe enough for all practical purposes.

The committee on train rules reported that the standard code is now in use on 109 roads with a mileage of 75,939. Seventeen more roads with 6,947 miles will soon adopt it. The committee declined to change rule 20 to provide for the difficulties sometimes met when conductors are in doubt as their right of track during the first few hours that a new time table is in force. The proper remedy, says the committee, is for the Superintendent to issue special instructions in accordance with rule 2. The committee also declined to change the rule touching blue flags so as to protect other persons than car inspectors. It would be impossible to make a succinct rule covering all the cases that it is desired to embrace. Other portions of this committee's report are yet to be put in print and will be reported in a later issue.

Messrs. Mackie and Graves, delegates from the Train Dispatchers' Association, presented a number of suggestions concerning changes in certain rules of the Standard Code. These suggestions were received and acknowledged by a resolution expressing cordial approval of the train dispatchers' action, and were referred to the Committee on Train Rules.

What is the Cost of Transportation?*

Since this body developed from a time-table meeting into an association for the consideration of matters pertaining to the operation and management of railroads, the subjects before it have been in keeping with the official position and professional reputation of those who have taken part in its deliberations. Yet not one of these subjects is of such importance to the members of this association as that to which I shall call your attention to-day.

The end and aim of a railroad is transportation. While transportation is its function, by transportation it must exist. It must be fed from its own products, and the charges for its services must be made with this in view. Whoever pays a freight bill or buys a passage ticket, contributes to the fund from which employes' wages and bills for supplies are paid, as well as interest coupons and stock dividends. That is to say, the charge for the service is composed of two elements—the cost and the profit; and the cost must come first. Stockholders may go without dividends and bondholders without interest, but unless the men get their wages they will not work, and supply men will not part with their goods without pay for them. The substance of this statement is that for a railroad to fulfill its purpose, the freight and passenger tariffs, as a whole, must produce a fund sufficient for the cost of operation, and if the fund be insufficient the service will be unsatisfactory.

Here we are brought face to face with the problem of making railroad tariffs, a problem about which there has been much making of speeches and writing of books by all manner of men—railroad experts, politicians and political economists. We hear much of the average rate per ton-mile and per passenger-mile, as also of the cost of transportation per ton-mile and per passenger-mile, all of which may have more or less value as information, though it would be difficult to point out its use in the practical operation of a railroad. It is well for the farmer to know the average price per bushel of grain and the cost per bushel for its production; for the iron master to know the average price and cost of production of a ton of pig iron, or for the manufacturer to know the average price and cost of production of a yard of cloth. The bushel of wheat, the ton of iron, the yard of cloth are units of trade by which the prices of these commodities are fixed, but the ton-mile and the passenger-mile are statistical abstractions and not the units by which the price of transportation is fixed. How easy it would be to make a tariff if all articles were transported at a uniform rate per ton per mile, and if all passengers were carried at a uniform rate per individual per mile. But the tariffs in actual use are made up of separate rates on different articles, or on different classes of passengers, for transportation between many places for varying distances. The local passage rate per mile is lost sight of when competition or commutation or excursions are to be considered, and the rate per ton-mile is the last thing thought of in making freight tariffs.

I do not intend to discuss the making of rates at any greater length. My purpose in calling your attention to the fallacies involved in the average rate and cost per ton mile and per passenger mile will be evident as I proceed, and you will pardon me for repeating, that while the cost of transportation must come out of the charge for transportation, that charge is not a uniform rate per ton mile and per passenger mile.

What is the cost of transportation? How is it to be ascertained? What is the correct definition of the term, cost of transportation? These are indeed questions of greater importance to the members of this association than any which have yet been before it. They lie at the bottom of most of the differences and dissensions which have risen between railroad corporations and the communities which railroad transportation has created. The most ignorant charlatan, the most rabid demagogue will speak you fair on this point. They do not object to paying reasonable rates. But what goes to make up reasonable rates? Here come in the conditions of long and short haul, of competitive and local traffic, of ascending and descending grades, of cheap or costly fuel and wages, and others equally familiar to those whose work-day lives are spent in their consideration. And considered they must be in discussing the cost of transportation.

Let us begin by defining what we mean by the cost of transportation. Do we mean the cost of operation? If we do, then we must include the cost of administration, of maintenance, repairs, and renewals generally, as well as the proper cost of transportation. If this be not our meaning, if we mean only the cost of moving freight and passengers, then we must still ascertain the other items which make up the cost of operation. We must ascertain them in order to exclude them, and, by eliminating them from the total expense account, arrive at the cost of transportation apart from the other classes of expenditure.

What are these classes? We will classify them as they relate more or less specifically to the movement of freight or passengers, beginning with those the most remote from that service, as, for instance, A.—Expenses not affected by amount of traffic; B.—Expenses indirectly affected by amount of traffic; C.—Expenses affected by train mileage; D.—Expenses affected by car mileage; E.—Expenses affected by amount of freight loaded or unloaded. On this basis all the items of expease in operation can readily be assigned to their proper classes.

In class A would come the cost of administration, as the salaries and office expenses of the general officers, and all other expenses substantially unaffected by the increase or decrease of traffic. In class B would be included those expenses which are indirectly affected by the fluctuation of traffic, as, for instance, certain expenditures in the roadway department. In class C would appear all expenses directly affected by train mileage, such as trainmen's wages and expenses incurred in the maintenance of locomotives. In class D would appear all expenses directly affected by car mileage, as the maintenance of cars, etc.

In such a division it will be found necessary to make yet another class, which I shall call class E, to include expenses directly connected with the loading and unloading of freight. I shall not refer in greater detail to the distribution among these several classes of the expenses which enter into the operation of a railroad. In actual practice I did this fifteen years ago with great minuteness, and have continued to observe the same distribution of accounts. It has been found invaluable in the discussion of all questions in which an analysis of the cost of operation is desirable. This collection of statistics recorded for fifteen years in such a form as I have here described has afforded the means for a critical comparison of the effects of improved methods upon the cost of operation, for in those fifteen years this particular property has been brought from a very inferior condition into average conformity with modern practice.

This classification of expenditures was devised with a definite end in view, viz.: To ascertain whether we received less from competitive business than it cost us to perform the service. For this purpose of what value is it to multiply the weight of each shipment made during the year by the number of miles transported, to sum up the results of these calculations into ton miles, to divide by this sum the total annual expenditures and obtain a quotient that we call the average cost per ton mile? Is this figure of six or seven mills, or whatever it is, the test which managers are to apply to rates on competitive traffic? Are they to withdraw from competition when the rate falls below this average for fear of doing business at a loss? Evidently not, for this figure is but the average of a large number of transactions, many of which were done at a much lower rate. Yet this is just what it would be valuable to us all to know. When shall we draw out of competition for certain business, because it would be a loss to carry it? And this is the information which I have sought to obtain. Confining myself for the present to freight traffic I will ask you to bear in mind that each transaction should be considered by itself, that is, will it pay us to take this article or that at a certain rate from such a place to such a place? One condition is that of quantity. Is it a single package, a car load, a train load, or many train loads? Another condition is that of direction. Is the movement in the direction in which the greater tonnage moves or in the opposite direction? This determines whether cars returning empty can be used for the purpose.

I take this then as the simplest form in which the problem can be presented. If you have an empty car at Buffalo, we will say, coming to New York, what will it cost you to bring a barrel of flour in that car? It will cost you the labor of handling that barrel, of billing it and the insurance of the common carrier's risk, and no more. If a carload be moved under the same conditions the items of cost are the same, increased with respect to labor and insurance. If your road were an intermediate link in a through line, you would not even have incurred the cost of billing and handling. But if the shipment be a train load, there is another condition to be observed, for your engine will not pull as many loaded as empty cars, and your locomotive mileage is accordingly increased. From this reasoning it appears that rather than lose the carriage of a single barrel or of a carload of flour in a car that would otherwise be moved as an empty it would pay you to take it at any price above the cost of handling, billing and insurance, but if the shipment amounts to a train load, then the locomotive mileage becomes an additional element of cost. The conditions change when competitive business is offered in the direction of greatest tonnage, for here the carriage calls for additional car mileage, and brings in all the items of cost directly affected by car mileage.

It is unnecessary for me to proceed further on this line of argument to show that the first requisite for an intelligent understanding of these questions is a knowledge of the cost of car service and of train service. This is what you want to know, and not the average cost per ton mile. This is just the kind of information that we have been gathering up on the road to which I have already referred, and it is interesting to note how these items of cost have been affected by the gradual introduction of engines and cars of greater capacity, by the variation in wages, by the development of telegraph and station service and by other changes in our ways of operation.

Stating the whole matter briefly and in a general way, railroads are not built solely for competitive business—that is, to take away the business which another road is doing. They are usually projected with the idea of developing the country through which they are to be built, of creating business by furnishing transportation facilities without which such business could not exist; of enabling grain to be grown on the western prairies, or coal and ore to be mined in the mountain ranges, or the trees of the forest to be converted into lumber. These are the purposes for which they are projected, and that they fulfill them is shown by the great anxiety to get a railroad built into a country, by the hearty welcome with which the first train is greeted, by the advance in value of the lands and town sites, etc. It follows that those who are the beneficiaries of this investment should at least pay for the cost of operation and maintenance, as they would have to do if the property were their own. This includes the cost of administration and all other expenses, as well as those directly affected by train service or what may be specifically called the cost of transportation. With reference to any particular road, this applies only to such traffic as is solely dependent upon it, for if a certain locality or class of traffic has a choice between two or more railroads, opportunity is afforded for competition. The distinction in this respect between what is known as the local and as the competitive or through business is that the local business of any railroad must pay sufficient toll in the way of passenger and freight rates to maintain that road, or be deprived of the necessary facilities which it affords, while the competitive business, not being dependent on it, may be diverted, as interest or other motive may direct.

Here it is that the importance arises of knowing what it costs to transport any specific shipment—a knowledge important to the local shipper as well as to the railroad manager, for if the railroad company loses the profit on competitive business, the loss must be made good from the local traffic, at least to the extent necessary to the efficient maintenance of the property. If the farmer, the miner, the lumberman, the manufacturer solely dependent upon one railroad could be brought to understand that the competitive business is paying part of the expenses which they and those similarly situated would have to pay altogether, if that business were lost to the road, they would cease to discourse of the long and the short haul and of the average rate per ton mile; they would only inquire as to the contribution which that competitive traffic was making toward supporting the road constructed for their benefit, and they would regret to see any such business lost to it. The converse of this proposition is that they are equally interested in seeing that this competitive business is not conducted at a loss, for if it be, then the tolls on the local business must be increased to make such loss good. It has seemed to me that the only sound reason for the regulation of railroad rates by law is thereby to protect those who cannot protect themselves, and this is a case in point. The local shipper ought to be protected against contributing to pay losses on competitive business, because he is in no position to make rates for himself, as the competitive shipper is. And this is another reason for knowing definitely when such a contribution is really made, that is, for knowing the actual cost of performing any specific service. With this idea clearly understood, the freight agent could make competitive rates intelligently upon being told the cost of car and train service under varying conditions. The injunction to "Get Business" would then be modified to get business so long as there is a profit, and the traffic and transportation department would be brought into accord.

Let us return to the question which I asked some minutes ago. What is the cost of transportation? As I have now developed my subject, the cost of transportation pure and simple is made up of three elements—the cost of train service, of car service and of handling the articles shipped or passengers moved. The test to be applied on this basis to any statement as to the cost of transportation, with reference to any particular transaction, is whether that statement includes any item which would not have been required if that particular service had not been performed.* If it does, then the statement is fallacious, misleading, untrue and without practical value to the railroad superintendent or traffic manager. This is the objection to the ton-mile basis. It is of no practical value to these officials in the conduct of their business, for it includes irrelevant items; but when they learn what it costs their company to bill and handle freight per ton, to run a train per mile and to move a car per mile, they have just the information required to know how low they can make rates for competitive business without paying for the privilege. This ignores all other items of expense incurred in the operation and management of the road, the cost of maintenance of the track, bridges and buildings, of salaries and office expenses, of general officers and of similar items. So it should so far as competitive business is concerned, for, as a general proposition, these expenses must be incurred whether any particular competitive shipment is made or not.

But if the competitive traffic is not to be charged with these items of expense, from what source are they to be paid? I say primarily from the revenue from local business, assisted, as may be, by the profit on competitive business; or, to put it differently, to the actual cost of transportation there should be added in making local tariffs an amount sufficient to provide for the expenses indirectly incurred in performing the service; somewhat as in fixing premiums on life insurance, the actuary of an insurance company adds to the assumed rate of mortality a so-called "loading" to include the cost of management and of other corporate expenses. This is what can be done on a railroad by such a classification of expenses as I have suggested. In making rates on competitive traffic the last three classes of expenditure should alone be considered. In making rates on local traffic the first two classes should also be considered. But it will be said that railroad companies incur large expenditures to handle competitive traffic which under this system of classification would be included in class B. This is true, as for instance in the establishment of extensive stock yards for competitive cattle traffic, or of elevators for grain traffic, or of coal pockets for coal traffic, but these cases are the more readily provided for by reason of this classification, for if such expenditures are not met as is generally done, by specific terminal charges, they should be added as a "loading" to the particular class of competitive traffic as a whole, and would appear as an invariable quantity in the sum total of the competitive rate on cattle or grain or coal, and would not be a charge on the local traffic at all. So it will be seen that such a classification of expenditures is capable of application to varying circumstances with a facility and precision not to be hoped for from the ton-mile unit of cost.

There is another view that I would present of this plan

*Address of President H. S. Haines at the meeting of the American Railway Association in New York, Oct. 14.

*In other words, any item which would have been a necessary expense to the road regardless of whether this shipment were secured or not.

of classification, with reference to the aid which it gives to the intelligent practice of economical methods; for, with such a division of expenditurps, any increase or decrease in the gross amount expended for any particular purpose appears just where it belongs. Defective wheels, axles and couplers add to the cost of car mileage, or class D. Increased wages of trainmen appear in the train mileage, or class C. Additional clerk hire or labor in handling freight affects class E; and items affecting the other classes appear accordingly. By this plan any extravagances or economies are shown up in a practical way as a guide or a warning for the future.

The analysis of expenditures so classified serves to show how expenses incurred for the greater comfort or convenience of the public may affect the cost of train or car service, and how an increase in the wages of trainmen and yardmen increases the cost of train service, which must be made good entirely from local traffic if competition, as for grain or other western products, is unbridled and unrestricted.

I have so far said but little about passenger service, mainly because with most of us the freight business is more important, but there are some points in connection with the former on which I will touch before I conclude. I would wish you to note the absurdity of considering the passenger mile as equivalent to the ton mile, an assumption common to railroad statisticians, and for which it would be difficult to give a sensible reason. Even if a passenger weighed a ton, the character of the service performed in transporting him one mile as compared with carrying a ton of freight that distance is so different as to make the assumption of equality of the two units to border on the ridiculous. They are so dissimilar that I have kept distinct the items making up the cost of train and car mileage in passenger and in freight service. This is quite another matter from the arbitrary division of all expenses between the passenger and freight traffic, as insisted upon by the Government statisticans, for there are many items included in my classes A and B which bear no relation whatever to the distinctive character of the traffic. That they should be considered in making passenger rates as well as freight rates is true, but, by keeping them separate from the actual cost of each service, their amount is known as well as the proportion which they bear to the actual cost of transportation, which is impracticable by the other method. We have also to consider that in class E, or the cost of handling freight, we have an entire class of expenses which has nothing to do with the cost of errrying a passenger. Indeed the passenger handles himself, and the only items bearing directly upon the transportation of a single passenger are the cost of printing his ticket and, perhaps, of handling his baggage, if he has any.

In some respects the cost of passenger service differs materially from that of freight service. The trains are generally made up of a fixed number of cars and run at stated intervals without regard to the number of passengers. The entrance of a single additional passenger into a train adds nothing to the cost of moving that train, and the cost of transporting a single passenger is therefore inappreciable. What is to be desired is to get the greatest revenue from the train per passenger car, and it might be more profitable to secure well filled trains loaded to the engine's capacity than to insist on a uniform rate per passenger mile which did not half fill the train. The unit of cost per passenger mile is as fallacious and valueless as the unit per ton mile. A passenger does not measure his desire to get to a place by the number of miles he must travel to reach it, and whether he goes fifty or sixty miles it costs the same to carry him if the train be scheduled for the longer distance and there be room for him. This idea of rate for distance does not prevail in making freight rates. What the freight agent wants is loaded cars, and that is what should be sought by the passenger agent, who is himself interested in knowing what it costs to move a passenger train and a passenger car when he is getting up excursion parties or meeting cut rates on business from a distance.

The practical value of the units of cost which I have recommended may be briefly illustrated by assuming that the cost of freight train mileage is 20 cents per mile, of freight car mileage 2 cents per mile, and of handling freight, 10 cents per ton. If 20 tons of competitive freight were offered to be moved in cars returning empty, the actual cost of transportation would be 10 cents per ton for handling or $2 for the shipment. If a larger lot were offered and the train of cars returning empty were thereby reduced one-third, the cost would be increased by the additional train mileage thus rendered necessary. But taking an example of a train load, say 30 cars of 20 tons capacity, offered in the direction of greatest tonnage, say for a distance of 200 miles, the actual cost of transportation would be made up as follows:

Handling 600 tons of freight at 10 cents per ton	$60.00
Car mileage, 30 cars 200 miles, 6,000 car miles, at 2 cents.	120.00
Train mileage, 200 miles, at 20 cents	40.00
Total	$220.00

which amounts to $7.33⅓ per car load, or 36⅔ cents per ton, and on this basis any rate that could be got over these figures would be a profit to the railroad company and a diminution of the burden on the local shippers. How valuable would such information be to the soliciting agent! You could then trust him to use his talents to get as much higher a rate as possible, feeling protected at least against doing the business at a loss.

On the other hand, assume the average cost of one-half cent per ton mile as applied to this case and you would have a cost of $1 per ton or $20 per car load to consider in competing for this shipment in place of the actual cost of $7.33⅓ per car or 36⅔ cents per ton. Who ever heard of a soliciting agent being called to account for making rates on competitive business below the average cost per ton mile as figured by the statistician? I may be asked, Do you mean to assert that freight can be carried at the rate of $7.33⅓ per car load for 200 miles without loss?

My reply is that I am not speaking of the entire traffic of a road, but of ascertaining for a specific transaction the lowest rate at which the service can be performed without actual loss to the railroad company. As I have already said, any loss in competitive business must be made good out of local revenue, and it is therefore to the interest of local shippers to sustain the efforts of railroad managers to maintain rates on competitive business by any fair means; this would include the legal recognition of agreements for pooling revenue from such business under proper regulations.

I have not attempted within the limits proper to this address to cover all the field for discussion which I have brought to view, nor to meet all the objections that may be offered to what I have advanced, but I have sought to impress upon you the absurdities of the ton mile and the passenger mile basis of rates, and the injustice to railroad managers of using such a basis for measuring their operations and for criticising their management.

I have further sought to show how the more rational basis which I have described may be made available for practical use in the traffic department, and how it may serve as common foundation on which law makers and railroad experts may build an enduring system of regulations in which long and short haul, just and unjust discrimination, through and local rates may all find an appropriate place.

Economy in Train Service.

The train service is the predominating element of every railroad engaged in the business of transporting freight and passengers for profit. Therefore, in considering the question of economy in the train service, we are brought in contact with the main-spring of the whole railroad business. The difference between the character of the train service of two competing railroads will generally account for the difference in their prosperity. A first-class train service is the best advertisement, and, with it, comparatively little money is required for drumming up business. I know that many companies pursue a different policy, and instead of spending money for the improvement of train service, large expenditures are made for talent in the traffic department—promoters, drummers, printers, etc., but the struggle is an up-hill one attended by constantly decreasing profit. Some of the worst operated railroads in the country have the grandest array of commercial talent.

From the very nature of the business economy in train service must be controlled by fixed principles. The basic principle is safety to life, limb and property. Economy at the risk of safety will always prove false. Thoroughly efficient service will produce the best returns. The commercial principle is rapid transit. Some may suggest that the commercial principle is low rates, but a little investigation will show that low rates are generally put in to make up for the difference in train service. My postulate, thus briefly reached, is: 1. That in the railroad business the train service is the thing of real value. 2. That the test of economy is the character of the service rendered. 3. That the principal factors are safety and rapid transit.

Good track with ample sidings and terminal facilities is the necessary foundation of all successful and economical management. The character of the locomotives and rolling stock exerts a large influence. Sufficient telegraph lines to readily accommodate the business, and the keeping of them up to standard, is a most important consideration. The use of the air brake makes it possible to increase the speed of freight trains, and at the same time reduce the risk of accident. But these conditions are generally controlled by the executive department, and the superintendent accepts them as he finds them. It is my purpose to deal particularly with the train service as it may be affected by the administrative policy of the operating department, or, in other words, with those matters which are strictly under the control of the superintendent.

Efficiency in the Passenger Train Service.—To run trains on time is the first consideration. Schedules should not be faster than can be made regularly. Nothing hurts a road so much as to be frequently behind time. Extras should be run as sections of regular trains, or on special time tables, the latter course being preferable to running a section much behind time. Most frequently it is the train behind time or the extra that gets into trouble. Great care should be exercised in the selection of conductors and trainmen. Qualities to meet and deal with the public in a pleasing manner are essential, and when such qualities are lacking, priority of service should be ignored. Cars should be thoroughly cleaned inside and outside before starting on runs, well lighted, and trainmen educated to watch the ventilation closely and intelligently; thermometers being desirable in every car.

Strict attention should be paid to the announcing of stations. It should be done always in the same words. The form given in the standard code is the best—"The next station is Jersey City." If the announcement is made in this form, it will be seldom that a passenger will fail to understand it, the name of the station being the last word of the announcement. This is an attractive and important feature of the service, but it is overlooked on many roads, every trainman having a form of his own—the prevailing one, as well as the most objectionable one being "Jersey City next.' In such an announcement the only word understood by the passenger is "next." Some of my friends who are strangers in New York, will better appreciate this point after a ride on the elevated road. In passenger service excellent results can generally be obtained by double-crewing the engines.

Efficiency in Freight Train Service.—Engines and train crews should run in groups; special fast freight crews and engines; through freight crews and engines; pick-up or distributing crews and engines; local freight crews and engines. The engines and train crews assigned to the respective groups to be selected with special reference to the work, and run "first in, first out." This will keep the engine and train crews on the same runs, and, in the majority of cases, the same engineers. In busy seasons sufficient extra crews should be kept in service to prevent overworking the men. It is, of course, highly desirable that every crew should be able to satisfactorily cover every run, but experience demonstrates beyond doubt that the safest aad best work is done when engineer and train crews are kept together on the same runs. This is especially so with fast freight and distributing trains. I am convinced that the maximum engine performance and minimum fuel consumption may be obtained by running engines strictly "first in, first out," known as "chain ganging," but I do not believe that the gain is sufficient to justify sacrificing the principal of keeping crews together in the interest of safe and prompt service.

The systematic making up of trains with reference to the destination of cars is worthy of careful attention. No excuse should be accepted for starting a train out on the road not properly made up. The place to do switching is in the yards, not on the road. In the majority of cases the trouble in blockaded yards is with the switching of cars received in trains, and the yard work is generally simplified when arriving trains have cars in proper position. Every empty as well as loaded car should be accompanied by a running slip showing destination, and all cars for a common destination should be kept together. Cars picked up along the road should be put in proper position in trains by conductors. This work can be readily supervised by an occasional examination of reports on file in the car record office.

While the true test of engine performance is the number of tons hauled per mile, the number of loaded cars (empty cars to be reduced to loaded basis) hauled per train mile should be watched with great care, also the movement of cars empty. For this purpose a statement should be obtained from the car record office each month showing the average number of loaded cars hauled per train mile; the total average number of cars handled, loaded and empty, on each run; and the percentage of empty to loaded car movement on the division. The statement should show the work done on the respective runs—fast freight, through freight, local freight, etc., as the information in such form will be specific and point out clearly the work performed by respective classes of trains and engines, affording a reliable check on the whole freight train service. Fluctuations in the train load are always reflected in the total of the pay-rolls.

The practice of running two engines on the front end of a train, called "double heading," which prevailed to a considerable extent some years ago, I believe has been almost entirely given up; but the use of pusher engines to help trains over grades, is still practiced to a considerable extent. I am of the opinion that, as a general rule, it does not pay to use a pusher engine, unless it will help other engines to pull twice as many cars over the entire run each day, as it would itself haul if engaged in pulling trains. This point of course needs qualifying, and I merely suggest it for consideration. No engine should be given more cars than it can readily handle over the entire run, the condition of the weather always taken into consideration. The chances of accident to a train running 30 miles per hour and keeping ahead of passenger trains, are much less than that of the overloaded train taking siding or crossing over for every passenger train on the road, and besides, the commercial value of the service is much greater. Each caboose car should be supplied with a set of good wrecking frogs. Their cost will be more than compensated for in the saving of delay to the road's traffic and the expense of ordering out the tool car.

The working of freight train crews up to the maximum limit of human endurance, sometimes beyond, is not without calamitous results. This is a serious question on many roads, especially when the crews are paid by the trip. During the busy season, perhaps for six months of the year, everything is at high tension, and for seven days and nights of every week trains are ready to go out as fast as crews come in. Here comes in the query, Shall we build up new crews, recruiting from the ranks of "floaters" and by the employment of green men, or shall we press the old crews continuously into service? On either hand there is danger. If new crews are built up, finally comes the dull season, and the new men must be let out, for, if retained in the service, there is not sufficient time to be made by either the new or old men to pay their expenses, and all become dissatisfied, which spirit breeds carelessness. How to absorb into general service through the dull season sufficient reliable freight crews to meet requirements during the busy season is the question, and on the ground that most efficient service is the most economical, it ranks first in importance among the many difficult problems which the superintendent encounters in his efforts to perfect a good train service.

Efficiency in the Train Service as a Whole.—The adoption of the standard code of rules, with such modifications and additions as may be necessary to meet local conditions, is desirable, and it should be the constant aim of the superintendent to see, by systematic examination and personal intercourse, that every man connected with the running of trains thoroughly understands them. The service should be closely watched as a conscientious duty to the employés, the company and the public. Rigid disciplinary measures should be applied for every infraction of the rules. Do not wait until some serious trouble arises that may call for wholesale discharge of men.

One of the most prolific causes of accidents is the frequent changing of men, many of whom being left without restraining influences, fall in with the great contingent known as "floaters,"—the bane of the railroad service. The man that is brought up on the road, carefully educated in its methods, and developed under a strict discipline, is the ideal trainman; and if by chance or by lapse of some human attribute, he fails at a critical moment, nine times out of ten he can be saved with profit. I was much interested a short time ago in a statement made by one of the speakers at a union meeting of the Brotherhood of Locomotive Engineers, concerning the operations of a very busy division of one of the trunk lines, to the effect that no passenger had ever been killed or injured while inside of the cars of any train on that division. The division referred to is in charge of one of the oldest superintendents in the country, and it is remarkable for few changes—the superintendent and nearly all of his men having been raised on the road. I made some inquiries concerning the superintendent a few days ago, and find that he is noted for always being around, getting on to everything, and holding everybody to a strict accountability. The men like him and stick to him, notwithstanding the fact that he is a hard taskmaster. I understand his family have tried for years to devise means to prevent his prowling around a certain terminal yard at night. I venture the opinion that the extraordinary immunity from accident is principally due to the vigilance of the man who is always around, and who keeps his men with him.

Block System.—For a safe and prompt movement of traffic over a crowded track, say 25 or more trains each way per day, the use of block signals is absolutely necessary, and with the effort to handle an increasing traffic at higher rates of speed, this fact is becoming more evident every day. As a great deal has been said and written about the theory of block signaling, I have thought it might be interesting to the members of this association to have a statement of facts based on actual practice. The Hudson River Division of the West Shore Railroad is 141 miles long—all double track except a branch 13 miles long extending from the main line to Albany. There are 43 block signal stations; 20 of them are operated day and night. The shortest distance between any two block stations is one mile; the longest distance between any two block stations by day is 7.4 miles, and by night 11 miles. Ordinary semaphore signals, manipulated by telegraph operators, are used. The cost of the signals per station is as follows:

2 masts	$16.75
2 lamps	6.50
Iron work and blades	40.00
Labor erecting	15.00
Total	$78.25

The additional expense for operators, above that which would be incurred were the division operated without block signals, is $280 per month. The system known as "permissive blocking" is used; but, on certain sections of the road where heavy grades or sharp curves exist, the blocking is absolute. Absolute blocking is also practiced during storms and foggy weather. The following rules are in force and explain the method of operation:

64c. A red light at night, and a red semaphore blade extended in a horizontal position by day, is a signal for trains to stop.

64d. A white light at night, and a red semaphore blade low-

ered to a hanging or nearly vertical position by day, is a signal for trains to proceed.

64e. The normal position of these signals will be to indicate danger, and to hold all trains. When there are no orders for the approaching train, and the operator has a report of the preceding train having passed the next block station the signal to proceed must be given promptly, and without causing delay to the approaching train, and should be given when the train whistles for the station, or when the engineer first sights the signal.

64f. If, on the arrival of a train at a block station, the preceding train has not been reported clear by the next block station, the train must be held until ten (10) minutes after the departure of the preceding train, unless in the meantime it is reported clear. Trains must not be reported clear unless they are off main track, or have passed one hundred (100) yds. beyond the block semaphore signal. If at the expiration of 10 minutes the preceding train is not reported clear, the operator will then give the conductor of the train held a written clearance [caution] notice showing the time at which the preceding train left, and the signature of the conductor must be taken on a copy of this notice to be retained by the operator. This clearance the conductor will deliver to the engineer before the train starts. The train so held will not start until the semaphore has been changed to safety. A train with a clearance entering a block, as provided for in this rule, will be held responsible in case of an accident caused by overtaking the preceding train.

64h. Operators must report promptly to the next block station in the rear, and also to the next block station ahead, the time of trains passing their stations.

64i. If no markers are displayed on the rear of a train, the operator at the next block station must be notified to stop the train, notify the conductor, and ascertain whether he has all the cars in his train. The block station in the rear must be notified that the track is blocked, until it is ascertained that the conductor has all of his train.

64n. The block signals do not relieve trainmen from observing all the rules in regard to the protection of their trains, and they must never rely on the block signals as a protection against following trains.

A supplementary order reads as follows:

One long blast of the whistle when approaching a station or block signal office, is all that is required. If the block signal is at danger the train must stop. Any engineer passing or leaving a block station when signal is set at danger, except as provided for in rule 64m, will be reprimanded, suspended or discharged. Conductors and engineers will report to the Division Superintendent whenever their trains are unnecessarily stopped at any block signal, and operators will report in like manner any engineers who violate this order.

The effect of this order is to keep operators on the alert to never stop or slow up a train unnecessarily. A time table rule of great value reads as follows: "Second class trains must clear each block 10 minutes or more before a following first class train is due to enter the block." The conductor of a train taking siding, or crossing over to the opposite track to allow a following train to pass, notifies the block operator and the following train is held at the preceding block station, or run under a "clearance" until the train taking the siding or crossing over is clear. If the train crosses over to the opposite track, the next block station in advance is also notified, and trains on the opposite track are held or run under a clearance until the train crossing over is out of the way.

Clearances [cautionary orders] are given by telegraph operators in the same form as train orders. Conductors send their copies to the division superintendent at the end of runs. They are checked against the train dispatcher's sheet to see whether their issuance was necessary by the positions of the trains or was caused by the dilatory action of operators.

During the month of August last, 3,160 trains were run, an average of about 100 trains per day, the shortest regular run being 33 miles. During the month, 92 clearance orders were issued to passenger trains, and 75 to freight trains, an average of about five per day. There has been one rear end collision during the past two years, which was due to a defective signal not going to danger, permitting a freight train to follow another in the same block without notice. The first train broke in two, and the detached portion was struck by the following train, doing slight damage to a caboose. The failure of the block signal in this instance, did not contribute to the accident.

We believe this system embodies everything practically essential to prevent rear collisions between trains. Under the absolute block system, in order to move trains over the line promptly, the block stations must be very close together, say not more than four miles apart; and consequently a much larger expenditure is required for plant and operators than under the permissive system, and, so far as our experience goes, without any better results. The permissive system has a great advantage over the absolute system in the matter of train flagging. Under it the conductor and flagman know that trains *can* and *do* follow other trains into the same block, and are on the alert to prevent collision. The superintendent knows the same thing, and, if possible, is more vigilant to see that the flagging rules are uniformly observed than if there were no blocks, as there can be no doubt that block signals of any kind create a tendency to trust them for protection. But under the absolute system this tendency is much greater than where permissive blocking is common. The conductor and flagman run a year without seeing a headlight behind them and finally believe that trains *cannot* follow other trains into blocks. Everything runs along smoothly for months and everybody begins to believe the blocks are absolute, and train flagging lapses. About this time some operator makes an error or an engineer mistakes a block signal; then there is trouble.

"Air Brake Failures."

The Usual Story.—At a late hour last night (Sept. 15) a freight train crashed into the rear of the Los Angeles express just west of Girard. One man was killed and several wounded. The express was notified of a small landslide which blocked the track. The slide proved to be of little importance, but the train was brought to a standstill on a steep down grade. The *airbrake refused to work*, and the train went down the grade through tunnels 15, 14 and 13 into tunnel 12, where it stopped. A freight train was sent along after the passenger train to clear up the landslide. The flagman who was sent back to flag the freight evidently did not do his duty, for the heavy train went on and ran into the rear of the passenger train.—*Press dispatch.*

The Facts.—This accident was investigated by Mr. H. C. Frazer, of the Westinghouse Air Brake Co., and his report follows. Of course the business interest of the company requires that its agents should ascertain and report the facts, and what follows was written for the information of the company and not for the public.

"Following is a report of accident on the Southern Pacific line near Tehachapi, Sept. 14. Train No. 18 coming toward San Francisco left Tehachapi on the evening of Sept. 14, 30 minutes late. Train consisted of 10-wheel engine No. 215, Engineer Hill; mail, express, baggage, smoker, ladies' coach, three tourists' sleepers, Conductor Fillmore. About three miles down mountain the engineer stopped on account of a red light in centre of track. The track walker had placed it there and then gone down to Girard, the nearest telegraph office. The engineer dropped down to the mouth of tunnel 15, left the air set on train, the brake valve on lap. Finding they would need a number of men to clear slide, Conductor Fillmore sent rear brakeman back to flag No. 22 freight that was following them. He sent the head man down to Girard to report. After standing there an hour the air reduced so on the train that it started. The engineer reversed engine, got sand running and kept throttle wide open. The conductor got three hand brakes set up; the train ran about 2,000 ft. before it was stopped. The engine was in tunnel 12 and rear of train was between tunnels 12 and 13. In trying to hold train engineer had knocked his steam down from 130 to 65 lbs. and no water in sight. It took 15 minutes before water showed up in bottom of glass. They then got the fire started, got up steam, charged the train, tried the brakes (in all 45 minutes), and had just started when freight struck them. In the meantime the freight came down to the slide and the men there told them the passenger train had been gone about 20 minutes. The freight man dropped along very slowly, however, and as he got through tunnel 13 saw the red lights on rear of train, but only had three or four car lengths to stop in.

"The officials of the company do not blame the brake at all. They blame Conductor Fillmore for not setting hand brakes, also for not sending back another flag when they made the second stop. They blame Engineer Hill for not having brakes set and train thoroughly charged and ready to hold it in case anything happened. There is a bulletin order on Southern Pacific which says that whenever a stop is made on the heavy grades for any length of time enough hand brakes must be set to hold train and give engineer a chance to have train thoroughly charged and ready for any emergency. Would say trainmen have always been in the habit of doing this, but failed to do so in this case. The conductor and baggage master testify that the engineer had his air pump shut off all the time they were at the slide. The engineer says he had the pump working, and that he thought the hand brakes were set. It looks to me as if they all lost their heads a little, and did not take ordinary precautions to look after the safety of train."

Another One.—A disastrous wreck occurred yesterday (Sept. 19) on the Union Pacific at Port Neuf, six miles from Pocatello. Passenger trains Nos. 1 and 2 collided, killing five men and seriously injuring several others. When train No. 2 left Pocatello the conductor had orders to sidetrack and pass No. 1 at Port Neuf station. As No. 2 neared that point it was discovered that No. 1 west-bound had the right of way, and was just stopping. When within less than half a mile of No. 1 the engineer of No. 2 examined his air brakes and discovered he had no control over the train. . . . In another second No. 2 crashed into the train then at a standstill. No. 2 was running at a high rate of speed. The coroner's jury held an inquest and attaches no blame to the railroad company, as the air brakes were working well when the train left Pocatello.—*Press dispatch.*

Mr. Frazer's Report.—Following is a report of the accident on the Union Pacific, near Pocatello, Sept. 19: "Train No. 2 from Portland came into Pocatello the morning of the 19th inst., and consisted of one 8-wheel engine, two mail cars, baggage car, two chair cars, one dining car, and one sleeper. The engine and two mail cars were cut off and went over on another track to pick up the baggage car from the Butte train. The air man applied the brakes on rest of train by letting air out of train pipe. The switch engine then put a chair car and sleeper on hind end of train. The air man coupled these cars up and opened stop cocks, which, of course, applied their brakes. He then went to head end and coupled up the three head cars, opened stop cocks and applied the head brakes. Another 8-wheel engine was then put on train to take it to Ogden, 150 miles. The engineer released brakes and went to office after his orders. After train was charged, the air man went up to engine and had fireman apply brakes. After examination he pronounced them all right. This train should have left Pocatello at 3:15 a. m. and met No. 1 westbound at Inkom at 3.40. Inkom is 12 miles away from Pocatello. As No. 1 was late, the dispatcher gave Nos. 1 and 2 orders to meet at Port Neuf, 6 miles from Pocatello. No. 2 left at 3:40 and struck No. 1 at 3:55. As it would take them five minutes to get out of Pocatello yard, they made a pretty fast run. As No. 1 had right of track, the head brakeman got on No. 2's engine so as to throw the switch when they got to Port Neuf. The conductor testified that as it was a short distance to the meeting point he would not work his train until he had met and passed No. 1. He was riding in the baggage car and heard the engineer whistle for Port Neuf. After waiting a few seconds and not feeling the brakes go on, he stepped to the side door and looked out, but could not locate just where he was. He then stepped to the other door and found they were about fifteen car lengths from the other train. He pulled the conductor's valve and kept it open until train stopped. No. 1 had pulled up within four car lengths of north switch. No. 2 had to come around a very short curve. The fireman and brakeman say that they did not see nor hear the engineer attempt to apply brakes at all. The engineer claimed he could not get the brakes on, but after the conductor pulled the valve the air came forward. Of course this is all nonsense, but he had to make some excuse. When the conductor pulled the valve they were all getting off the engine. There is no doubt that the engineer overlooked his hand and forgot his orders, more especially as the regular meeting point was at the next station. The fireman called to the engineer that they were getting too close, but he did not offer to apply brakes. I think the engineer thought it was a freight train, and that they were on side track. The engineer was on outside of curve. The officials blame the engineer."

THE SCRAP HEAP.

The Canadian Pacific Station at Vancouver.

The ground for the new station of the Canadian Pacific at Vancouver, the Pacific terminus of the road, is being leveled and work on the building will be begun shortly. The building will be 167 ft. in length from east to west, running parallel with the track. The elevation of the main building fronting the harbor will be four stories. The frontage on Cordova street, facing Granville, will be two stories and 45 ft. high. On the ground floor will be located the waiting, ticket, baggage and other rooms; on the next the offices of the Assistant Superintendent, Mr. William Downie, and others in connection with the operating department. On the first floor, entering from Granville street, will be the offices of Mr. Abbott, the General Superintendent of the Pacific Division, of the Land Department, the city telegraph office and others. The second floor on the Granville side will also be used for offices. The width of the main building will be 63 ft., the addition to which will be the tower, which will project 26 ft. 6 in.; its width being 55 ft. × 89 ft. 6 in. from front to rear. From the level of the track it will rise to a height of 100 ft. In the tower are to be located the general telegraph offices. The tower will be built on pillars supporting the archway over the "porte cochére." The tower is the most striking architectural feature of the building. It has six stories. The style of architecture will be Flemish. Leading down to the lower floors from Cordova street there will be a broad stairway for passengers. The foundations will be of granite. St. Boniface white brick will be utilized in building the outside walls and local-made brick the inside ones. When completed the building will not only be the most commodious, but it will also be the most imposing structure of its kind on the coast. Many changes have been decided upon in the matter of improvements and maintenance on the Pacific Division. It is now the intention of the company to put in stone arches for all the larger culverts. The curves will be reduced to the lowest possible minimum, and in many cases eliminated.

The World's Fair.

The resignation of Mr. E. T. Jeffery from the Board of the World's Fair, as well as that of Mr. H. H. Kohlsaat, has necessitated the appointment of two new members. Those elected to fill the places were H. B. Stone, President of the Chicago Telephone Company, and formerly Second Vice-President of the Chicago, Burlington & Quincy Railroad, and Franklin H. Head, President of the Union League Club and Vice-President of the American Trust and Savings Bank of Chicago. Mr. Jeffery's resignation from the Board was on account of his new duties as President of the Denver & Rio Grande Railroad requiring his change of residence to Denver, and his loss will be greatly felt by the remaining members.

"Careful and Fortunate in Securing Urbanity."

An Oregon paper finds the following posted in a Southern Pacific station:

"To agents and other employés: In dealing with the public, especially with our patrons, it is often necessary that you should observe much patience and self-restraint, always endeavoring to follow the dictation of good sense and prudence, in order that you may make the most favorable impression upon your patrons. Treat them as any other good business man would deal with his customers with the view of making the road popular. Those who do not manifest that urbanity of manner and uniform courtesy tending to impress the public with the assurance that we have been careful and fortunate in the selection of men, will be dismissed from the service of the company. This notice must be kept posted in a conspicuous place, and our patrons are respectfully required to report to this office any want of attention or courtesy on the part of employés."

The Longest Iron Shaving.

According to the *Iron Trade Review* a controversy was started by the claim of Wm. E. Donelly that an iron shaving 107 ft. long, made by him, was the longest known. This claim was promptly met by George Bersching, who showed an iron shaving 111 ft. long; whereupon Worth's Museum, of New York City, came to the front with one 175 ft. long. But this it seems cannot be allowed to stand as the maximum, for Tom Curry, an apprentice in the works of the Brush Electric Company at Cleveland, turned an iron shaving 237 ft. long. This shaving, which is said to have hung on the walls of the Brush Company's works for eight years was lately broken.

A Little Story About Ticket Commissions.

Investigation shows that the ticket agents on the Lake Shore & Michigan Southern, who were discharged for accepting commissions, were not betrayed by the roads that paid the commissions. General Passenger Agent Smith adopted schemes which enabled him to ascertain the fact that certain agents were receiving commissions. At an important office he was surprised that so many coupon tickets were sold reading over an indirect line. To prove this he told the agent he deserved a rest, secured him transportation for himself and wife, and sent him off, although the agent was rather reluctant about going. An agent was put in his place without posting him as to the object, and during the month not a coupon ticket was sold over the route which had been so popular with the old agent, passengers all being routed over more direct lines. Other schemes were resorted to until the agents on the road had been pretty thoroughly tested, and those against whom sufficient evidence had been gathered were dismissed from the service of the company.—*Western Paper.*

An Ambitious Rival Harbor to Chicago.

The Elgin, Joliet & Eastern Railroad has completed plans for extensive slips and docks to be connected with the harbor at Waukegan, Ill., its lake terminus, 25 miles north of Chicago, and contracts are about to be let. There will be a connecting slip about 300 ft. wide and 500 ft. long, extending westerly from the harbor. From this two slips 150 ft. wide and 2,200 ft. long each will extend north through what is at present an extensive marsh. Between these will be a strip of ground 300 ft. wide, on which tracks will be built. The dock frontage thus secured will be about four miles. The cost will be anywhere from $100,000 to $300,000.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The Superintendents' Society has had another successful meeting, and although the attendance was not large the interest of the members seems to be well sustained. That this interest is real may be inferred from the promptness with which they have paid their dues. Holding the meeting so early in the week may be partially responsible for the smallness of the increase in attendance. The dinner seemed to be thoroughly appreciated by every one, and as the general tone of the organization is decidedly informal and social, it will no doubt become a permanent feature. But aside from the dinner this meeting was quite different from last year's. Then the discussions were the most important feature; this year it was the addresses; though if these had been finished at a more favorable hour it is not unlikely that there might have been some good discussion this year. The work that was done just filled out the day, and no one was ready to move for a second day's session, which *might* be a dry one, although it was plain that it might have turned out a very profitable one.

It is a good thing that the Society has decided to get up a catechism on train rules. Such a device is needed in connection with the standard (or any other) code, especially on large roads where different division superintendents are liable to constantly develop little inconsistencies; and this is true even admitting that there is some force in the objection that candidates may steal copies of the catechism and learn answers on the parrot plan instead of studying intelligently. A catechism is of decided value even if it never goes out of the superintendent's hands; but we have the testimony of experience that printed questions and written answers (written by the catechumen himself) are actually valuable. We take the liberty of reminding the committee that the *Railroad Gazette* has printed accounts of a number of catechisms prepared by individual roads during the past four years. We have persistently recommended this method of improving the service, but the task of carrying out the recommendation has proved too great for most superintendents. With the aid of this committee's work it is to be hoped that this obstacle will vanish. Although the catechisms that we have printed have innumerable good features the committee will find ample room to make one still better than any of them. It is wrong to uniformly make the questions in such shape that the answer will be only a repetition of the printed rule, and it is equally wrong to do nothing but constantly attempt to "stump" the candidate by tough conundrums that he will not encounter in practice for 10 years; the most successful catechism will combine the merits of both, and the combining process calls for a good deal of work.

The practical feature of the meeting was Mr. Wattson's paper. His subject was one on which it is very hard to speak with mathematical precision in a brief paper, but the points brought out, of which the address was packed full, were all as important as though stated in dollars and cents. The facts concerning his operation of the block system were of special interest, and those who are inclined to dispute his assertion that a space interval is indispensable where 25 trains a day are run should read the paper with care. Although permissive blocking is practiced every day—chiefly because the road, like most others, is compelled to make considerable use of passing sidings which are remote from stations—it will be seen that practically 95 per cent. of the train movements are made under absolute blocking. Mr. Wattson's defense of permissive blocking as necessary to the integrity of the flagging system very clearly indicates the difference between English and American practice on this matter, and will attract general attention. Although both there and here the flagging rules are printed along with the block signal rules and prescribed as of equal force, it is familiar knowledge that over there the absolute system, where used, is so completely relied on that flagmen are seldom if ever censured for not going back. It may perhaps take several centuries to conclusively prove from experience which plan is the safer, but in the meantime we repeat our appeal that, whichever way the work is done, the rules be made to "consist" with it. The mere presence of a flagging rule in the book is no just defense for the superintendent when his block system fails; while, on the other hand, its presence there when it is admittedly a dead letter, as in England, is nothing but a farce.

The Time Convention held only two short sessions, which were devoid of discussion. The address of the President, which we print in full, was the principal feature, and that is notable more on account of its author than by reason of its being delivered at this meeting; though Colonel Haines' custom of speaking on a topic which is somewhat novel to the Association may not be without its influence on the future action of the Association. This body has apparently settled down to the conservative custom of doing its work almost wholly through committees, the semi-annual meetings doing little but approve what has been done between times. The Safety Appliances Committee has made a report which, like that made by it at the last meeting, merely gives formal expression to conclusions which every one had already settled in his own mind. The Association has shown its approval of the Superintendents' Society by electing the Secretary of the latter to a position on an important committee. Colonel Haines' address was an admirable presentation of the vital considerations involved in making rates, although, as he intimated in closing, some of the toughest problems connected with the subject are not taken up at all. We can hardly imagine, however, that any of his hearers were so young in railroading as to be in need of such instruction, and conclude, therefore, that the forcible propositions so vigorously set forth are meant for their use when they have to deal with the legislating Granger. It is, unfortunately, true that many high railroad officers still lack the courage to fearlessly state the whole truth when defending their course before public bodies, and it is to be hoped that such men will be braced up by Colonel Haines' words.

Readers will remember that about a year ago, to wit, Oct. 24, 1890, we gave some statistics of the cost of train accidents on a certain road, showing the number of accidents and their cost as compared with the train mileage. This kind of information does not flow toward a newspaper office spontaneously, and the intervals between reports are necessarily somewhat long, but we are able to-day to present some figures from another large road. The information now received is for a single month, whereas that given in our previous article was for a whole year; and the value of the present figures is therefore quite limited, whether they be used independently or in comparison with what we knew before; but our object in presenting this is not so much to give accurate figures as to show that such accounts are carefully kept and the method in which they are kept. Nothwithstanding their defects, the statistics here given are of interest in various ways, and should suggest to other roads the desirability of comparing notes on this subject; especially as we are able to state with perfect confidence that the general manager who gave us his report a year ago has slept o'nights fully as well as before, if not a little better. The present report is a summary made for the General Manager, and shows 24 accidents on nine different divisions of the road. Two divisions show no accident whatever, and the figures for all the divisions, except one, are small. Indeed it would seem quite certain that a numerous class of small accidents included in the total given a year ago is omitted in the report now before us. This report has 11 columns, headed, respectively, number of accident, division, date, train, place of accident, cause, nature of accident, nature of damage, cost, action taken, remarks. The total of the cost column is then divided by divisions and again by causes. The last named classification is shown in condensed form below. The average cost per accident was $594.

Without further comment on the statistics, which are necessarily insufficient for important conclusions, we present in the following tables, the averages that we have deduced, *A* representing the road reported upon last year, and *B* the road from which we have the monthly report.

	A.	*B.*
Accidents per 10,000 train miles	.732	.236
Accidents per 10,000 freight train miles	1.040	.342
Cost of accidents per freight train mile, cents	1.690	2.030

The train mileage of road *B* is estimated. Of the totals the percentages attributable to some of the principal causes were as follows:

	A. No of accidents.	*B.* Cost of accidents.
Defects of road	10.2	1.8
Defects of equipment	*	6.
Negligence in operating	45.	80.4
Unforeseen obstructions	*	11.8
Others	40.9	....
Unexplained	3.9	....
	100.0	100.0

*Included in fifth item.

That the most prolific and costly sources of train accidents come under the head of "negligence in operating" is familiar knowledge to all who have followed our monthly record, and it will be seen that this report substantiates that conclusion. During the month there was one accident that cost nearly $10,000 and no other which cost over $1,000. Tthere is a strong temptation to eliminate this costly one as exceptional and draw the averages from the remainder, but this is unfair in the long run and must be regarded as equally so here.

Exports from Gulf Ports.

Mr. Gould is reported as saying that his system will soon be in a position to divert a larger quantity of export grain to New Orleans, and some discussion has arisen in consequence. The *Kansas City Times* publishes a long communication regarding the probability of making that city a large grain market, because of the short distance to New Orleans or Galveston as compared with the distance to the Atlantic seaboard. The completion of the short link of the Central Arkansas to a junction with the Texas & Pacific at Alexandria will open up an almost direct rail line to New Orleans. The Missouri Pacific already has a line into Kansas running from the Little Rock & Fort Smith and crossing the Missouri, Kansas & Texas at Wagoner. New Orleans can now be reached from Kansas over Gould roads, though the route is a little circuitous, but with the connecting links completed the corn raising sections of Kansas can be brought almost as near to New Orleans as to Chicago. It is not at all improbable that Mr. Gould's people may make more of an effort to secure export grain via New Orleans than has yet been done.

New Orleans is now doing a fair business in export corn to Europe, though the matter does not attract general attention. The following table gives the number of bushels of corn exported through the different ports in 1890:

New York	24,550,165
Baltimore	18,854,951
Philadelphia	16,814,795
New Orleans	12,028,362
Boston	4,590,085
Montreal	4,970,2·6
Various	5,008,626
Total exports of corn	86,817,220

The total grain exports from New Orleans in 1890, including flour reduced to bushels, were 13,951,463 bushels, so that corn constituted 90 per cent. of the exports. Of the 12,000,000 bushels of exported corn, 8,717,850 bushels reached New Orleans from St. Louis by the Mississippi River. In the previous year the receipts by river constituted nearly all the corn exported and this river trade has always been the main source of supply of corn at New Orleans, though receipts by rail were larger in 1890 than in previous years.

The rates on the Mississippi from St. Louis to New Orleans, are about 7 cents per bushel on bulk grain in barges, and 10 or 11 cents when in bags and by steamboat. As compared with Mississippi River rates, the lake and canal rates on corn from Chicago to New York averaged about 6 cents per bushel in 1890, including elevator charges at Buffalo. There does not seem therefore to have been much difference in through rates to tidewater from Kansas City whether the corn went by rail to St. Louis and thence down the Mississippi, or by rail to Chicago and thence by lake and canal to New York. During the seven months of navigation in 1890 the canals brought to New York as much corn as did all the trunk lines, the latter of course carrying the corn during the winter months.

It will be seen, therefore, that the first thing which

the Missouri Pacific must do to get export corn to New Orleans is to compete with existing river facilities. Such competition would no doubt result in an increase in the receipts at New Orleans, though it must be a long time before any great impression can be made upon the export traffic to the Atlantic seaboard. In 1890 St. Louis sent but 8,717,850 bushels of corn down the river to New Orleans, though the former city reports her corn receipts at over 45,000,000 bushels. If the rail and river lines to the Gulf had been diverting large quantities of export grain from the Atlantic routes, that fact would have compelled a re-adjustment of seaboard rates. In this connection it is interesting to note that some 15 years ago, grain to New Orleans constituted a very important part of the Illinois Central traffic, a traffic which has been drawn away from the Gulf to the Atlantic ports. New Orleans and Galveston could in any case take away only the exports and imports of such of the Western States as are nearer to the Gulf; but with the outflow from the Atlantic cities, with the certainty of return cargoes, with the ocean passenger traffic of the East, with the preponderance of eastern capital, we may assume that the chances are favorable to a continued carriage of the larger part of Kansas and Nebraska grain to the Atlantic seaboard when for export to Europe.

We do not mean to say that a deep water harbor on the Texas coast is not a work to be encouraged; but it is not well to raise expectations which will require years for realization. No Gulf port, however advantageous its harbor, can expect at once to draw large quantities of European grain away from the old-established routes. New Orleans is 107 miles from the Gulf, and the voyage from that city to Liverpool is longer than from Atlantic ports; return cargoes, too, are not so assured. When a large export and import trade is developed in the future via the Gulf because of the growth of the states west of the Mississippi, the Atlantic ports will have increased their traffic correspondingly, so that each route to Europe can rejoice in the common prosperity.

New Securities and Better Times.

The announcements in the last few days of new issues of railroad securities indicate that financiers are prepared to take advantage of the improvement in the investment market, and of the increased net earnings which every one is looking for. The bonds which have been offered will be useful as a test of the readiness of the public to turn their invested capital into railroad securities, and the effect of issuing them will be closely watched; this because many other railroads need funds to improve their lines, which they could not obtain heretofore. The railroads have felt severely the effects of the financial depression. Needed improvements have had to be postponed, and those that were imperative have created floating debts on many lines. It is to be remembered that this debt is often held by syndicates who are waiting for a favorable market to dispose of the bonds representing their temporary advances.

It is encouraging that the new securities are issued by old companies for equipment and improvements which will increase earnings and reduce expenses. No attempt is made to float bonds to build new competing lines. There has been no change in the attitude of the market on that point, and there is not likely to be any this year.

The success of the Union Pacific in funding its $20,000,000 floating debt seemed to show that good securities would find a ready market. The five and a half millions of the bonds offered to the public were largely over-subscribed in two days. Since then announcements of plans for issuing new bonds and stocks have been made almost daily.

Few railroads can order $2,000,000 of new equipment, and pay for it, as the Chicago, Burlington & Quincy intends to do out of the net earnings, but the Lake Shore, the Boston & Albany, and the New York Central in the last few weeks have given out large contracts for rolling stock, which may be paid for out of net earnings. The Columbus, Hocking Valley & Toledo proposes to reduce its fixed charges and be able to buy equipment, by issuing $2,500,000 of five per cent. preferred stock at 50 to fund maturing seven per cent. bonds and car trusts. The Lake Erie & Western will soon issue $1,500,000 second mortgage bonds for equipment and to improve its facilities. The Rock Island will increase its fixed charges by issuing $2,000,000 for new construction and improvements which have been paid for out of earnings applicable to dividends, and $4,000,000 bonds sold by the Northern Pacific in the winter have just been put on the market. A syndicate has underwritten a new issue of stock of the Louisville, New Albany & Chicago. The company has an inadequate supply of cars compared with the business offered it, and the officers figure that with the expenditure of $1,000,000 the earnings can be increased $1,600,000 annually.

The Baltimore & Ohio has earned a good surplus the last two years, which has been expended in much needed betterments on the road. The possibility of a stock dividend is talked of, and the amount placed as high as $10,000,000. The transfer of the Ohio & Mississipi and the guarantee of $8,000,000 of its stock by the B. & O. will enhance its value, but this matter seems so indefinite that it cannot be said whether any of the new stock will be offered to the public.

There is a large part of the business community, besides holders of railroad securities, who are watching with intense interest these indications that the railroads will soon have more money to spend.

Annual Reports.

Northern Pacific.—We have advance sheets of the report of the Directors for the year ending June 30, 1891 The General Manager's report is not yet received.

The results of operation are:

Gross earnings, not including Wisconsin Cen....		$25,151,544.09
Operating expenses	$14,910,402.18	
Taxes	460,594 44	
Total operating expenses and taxes..... ...		15,400,996.62
Net earnings from operating.....		9,750,547.47
Other receipts		1,593,135.28
Total net income.....		$11,343,682.75
Payments:		
Rentals....	$1,362,114.25	
Guarantees to branch roads..... ..	1,014,698.05	
Interest on unfunded debt..	6,247,074.28	
Wisconsin Central and Chicago Terminals..... ...	387,365.43	
Improvements to tunnels and main lines	153,639.95	
Interest other than unfunded debt..	105,717.81	
Sundry items.....	162,320.43	
		$9,432,930.20
Surplus over expenses and fixed charges...		$1,910,752.55
Dividends, at four per cent., on preferred stock...		1,472 466.00

The principal changes from the previous year are decrease, in through passenger earnings, $165,367, or 9.7 per cent.; increase in local passenger earnings, $697,323, or 16.6 per cent.; increase in freight earnings (other than company's), $1,864,034, or 12.39 per cent. Of the total freight earnings, local traffic yielded 77.6 per cent.; the through, 18.9 per cent.; and the carriage of construction material for the branch lines, 3.5 per cent.

The common stock remains the same as in previous years. Of the preferred stock, $324,711.35 was cancelled by land sales during the year.

Up to the end of the fiscal year, underlying branch bonds to the amount of $12,350,000 have been retired by the substitution of a like amount of consolidated bonds, making the latter a first lien on 612.59 miles of completed road. There have also been issued $15,944,000 of consolidated bonds for the construction and acquirement of new road aggregating 663.72 miles, on which they are also a first lien. The consolidated mortgage bonds, therefore, are now secured by a first lien upon 1,276.31 miles.

In the matter of the indebtedness of the company, $6,000,000 has been incurred in advances for the enlargement and improvement of Chicago terminals, for which the company holds bills receivable secured by first mortgage bonds. The work on these terminals is now approaching completion, and the company will soon be able to reimburse itself for these advances by the sale of the bonds, for which proposals have already been received, including a firm offer for a large amount. The remainder of the floating debt of $5,350,000 has been incurred in the construction of branch lines and purchase of equipment. Since the close of the fiscal year about $2,000,000 of this indebtedness has been discharged.

Terms have been agreed upon with the Baltimore & Ohio for the use by that company of the Chicago terminals of the Chicago & Northern Pacific, and the contract will soon be executed by both companies.

The increase in total mileage for the year was 529.21 miles, making a total of operated mileage at the close of the fiscal year of 4,333.18 miles. The principal increases during the year were as follows: Duluth, Crookston & Northern, 22 miles; Northern Pacific & Montana, 122 miles; Central Washington, 20 miles; United Railroads of Washington, 66 miles; Northern Pacific & Manitoba, 263.5 miles. The average mileage operated during the year was 4,222.2 miles.

The shops at Tacoma are about completed. They are substantially built, and are equipped with the best machinery, with electric lighting and propulsion, and have connected with them ample yard room and tracks.

"The Wisconsin Central lines have been operated by the Northern Pacific during the year. The results have proved the lease to be as important commercially to the Northern Pacific as was expected, this company being greatly assisted by the Wisconsin Central connection, and by the control of the very valuable terminals of the Chicago & Northern Pacific in the city of Chicago. The sum paid from income to the Wisconsin Central and Chicago terminals arises entirely from the improvement and use of these terminals in Chicago. It is expected that in the future this use will be secured to the Northern Pacific and Wisconsin Central lines without any further annual charge."

New York Central & Hudson River.—This report is for the year ending June 30, 1891, and is the first complete annual showing since the change in the end of the fiscal year from Sept. 30 to June 30.

The increase in properties operated is thus summed up: The mileage, revenue and general business have been largely increased by the lease of the Rome, Watertown & Ogdensburg, and its leased lines, the Beech Creek Railroad, and the acquirement of the Syracuse, Ontario & New York through lease to the West Shore. On the 1st day of October, 1890, the Beech Creek Railroad was leased for the term of 999 years. It extends from Jersey Shore westerly to Gazzam, a distance of 101.27 miles, through the counties of Lycoming, Clinton, Centre and Clearfield, in the State of Pennsylvania, with various mine branches aggregating 28.35 miles. Direct connection with the main line of the New York Central & Hudson River at Lyons, N. Y., is made via the leased lines of the Fall Brook Coal Co. On the 14th day of March, 1891, the Rome, Watertown & Ogdensburg, together with its leased lines (the Utica & Black River, the Oswego & Rome, the Niagara Falls Branch Railroad, and the Carthage, Watertown & Sacket's Harbor, a total of 629.18 miles, all in the State of New York, was leased for the term of its corporate existence. Since July 1, 1890, the Syracuse, Ontario & New York, extending from Syracuse, N. Y., to Earlville, N. Y., a distance of 45.49 miles, has been operated as the Chenango branch of the West Shore. The mileage and operations during the entire year are included in this report. Comparison with the operations of last year is affected by the increase in mileage and business due to the lease of the Rome, Watertown & Ogdensburg and by a strike of the yardmen, trainmen and switchmen, which occurred on the line of the New York Central & Hudson River in August, 1890, resulting in a partial suspension of traffic on that part of the system. The total miles of road operated were 2,096.46.

The following is a comparative summary of operations:

	1891.	1890.	Inc. or Dec.
Gross earnings	$37,902,115.26	$37,008,403.91	I. $893,711.35
Op. expenses..	25,370,852.41	24,492,130.46	I. 878,721.95
Exp. to earnings	(66.94%)	(66.18%)	
Net earnings	$12,531,262 85	$12,516,273.45	I. 14,989.40
First charges..	8,881,964.30	7,853,811.23	I. 1,028,153.07
Profit, 4.08%.....	$3,649,298.55	$4,662,462.22, 5.21%	D. 1,013,163.67
Dividend,* 4.00%	3,577,132.00	4,024,273.50, 4.50%	D. 447,141.50
Surplus.....	$72,166.55	$638,188.72	D. 565,022.17

*An additional special dividend of one half of one per cent was paid out of the surplus earnings of the previous year.

The tons of revenue freight carried were 16,021,567, and the ton-miles of revenue freight were 2,890,066,046, a decrease of 3 per cent. The freight earnings decreased 4.6 per cent. to $21,456,473, and the passenger earnings increased 7.3 per cent. to $11,681,109. The following table shows changes in earnings and expenses per traffic unit:

	1891.	1890.
Earnings per ton per mile..... ..	cts. 0.74	cts. 0.76
Expenses per ton per mile.....	cts. 0.57	cts. 0.54
Profit.....	cts. 0.17	cts. 0.22
Earnings per passenger per mile.....	cts. 1.96	cts. 1.96
Expenses per passenger per mile.....	cts. 1.49	cts. 1.53
Profit.....	cts. 0.47	cts 0.43
Earnings per train mile, freight..... .	$1.86	$1.88
Expenses per train mile, freight	1.43	1.33
Profit	$0.43	$0.55
Earnings per train mile, passenger (including mail and express).....	$1.25	$1.10
Expenses per train mile, passenger.....	0.80	0.86
Profit	$0 45	$0.24

The following table, showing earnings per mile, is interesting as showing the effect of taking in the large mileage of light traffic:

	1891. 2,096.46 miles.	1890. 1,420.64 miles
Freight earnings per mile of road operated.....	$10,234.62	$15,837.39
Freight expenses per mile of road operated.....	7,868.10	11,247.91
Profit	$2,766.52	$4,589.48
Passenger earnings per mile of road operated....	$5,571.83	$7,686.58
Passenger expenses per mile of road operated.....	4,233.66	5,992.29
Profit.....	$1,338.17	$1,694.29

The charges to construction account for the year amounted to $723,398, of which about $440,000 was for third track, Spuyten Duyvil to Sing Sing.

Old Colony.—This report for the year ending June 30, 1891, shows increased earnings and expenses and decreased net earnings, as below:

	1891.	1890.	Inc. or Dec
Gross earnings.....	$8,376,452	$8,020,295	I. $356.15
Operating expenses.....	6,014,900	5,526,859	I. 488,04
Taxes	455,374	433,580	I. 21,794
Net earnings.....	1,906,178	2,060,856	D. 157,67

The expenses for the year include $534,800 for the Quincy accident of Aug. 19, 1890. There are still some outstanding claims, but they are said to be small. This one charge is nearly $25,000 more than the increase in operating expenses and taxes. In spite of it, however 7 per cent. dividend was paid. The cost of new equipment was $262,462, which was charged, $148,777 to expenses, $25,030 to the improvement and $88,655 to equipment account. This charge to equipment account is very exceptional for this company, but the directors consider i "justified for this year." They also say that "the addi tion of new passenger cars has been very large for the

past few years, but has only stimulated the public demand for a further increase," and a large expenditure must soon be made for more. It is suggested also that some freight cars ought to be bought. Following are some statistics of operation :

	1891.	1890.
Passengers	22,395,487	21,305,226
Passenger-miles	263,581,669	249,441,805
Tons freight	3,455,500	3,076,138
Ton-miles	114,945,965	112,893,604
Miles run, passenger trains	3,610,353	3,439,628
Miles run, freight trains	1,491 750	1,461,395
Miles run, other trains	1,308,439	1,290,441
Whole number of miles run	6,410,542	6,191,464

It will be remembered that the British Board of Trade has within the last two years gathered information from all roads in the United Kingdom concerning the extent to which trainmen and signalmen are worked over 12 hours at a time or are allowed insufficient rest, and that during the strike on the railroads of Scotland last winter Parliament appointed a committee to investigate the subject. The salient facts gathered by the Board of Trade were presented in the *Railroad Gazette* of Feb. 6 last, and in the issue of March 6 we gave further news on the subject. The report of the special Parliamentary committee has just been issued and makes a bulky volume, a large amount of testimony having been taken. No facts of importance are, however, given which were not shown by the report issued by the Board eight months ago, and which were summarized by us as just noted. This summary was to the effect that there were a great many instances in which men worked over 12 hours a day and in which they rested less than eight hours between trips; but that the percentage of overwork—that is the number of instances as compared with a man's total work for a month—was not shown in sufficient detail to enable instructive conclusions to be reached by any one not well acquainted with the service reported upon. The principal value of the report now issued is in the opinions it gives. These are just what might have been expected. The directors and managers who testified were unanimous in condemning excessive working hours and in asserting that they had done their best to correct all evils in this line. The Government inspectors could name but one accident directly attributable to overwork, yet presented with great force the evidence in their hands of the strong probability that this cause has contributed to a considerable number of bad collisions. The leaders of the employés' union reported that their constituents were not agreed as to what they want, some desiring to work long hours, for the obvious reason that their pay is so small that they are ambitious to work up to the limit of their strength. The whole discussion simply brought the matter back to the ground on which the most intelligent railroads have all along acted, to wit, that a railroad company must, for its own selfish ends, in the interest of economy, prohibit hours which impose excessive strains upon men. The inexorable law of supply and demand remains the great factor in the case, and none of the witnesses could gainsay the fact. General Manager Findlay, of the London & Northwestern, insisted on the importance of discipline, both as related to profit and to safety. If the servants got the idea that there was a higher authority than the railroad officers, there was an end of discipline. Mr. Findlay, continuing, said: "I have not the slightest hesitation in admitting that the investigation this committee are now pursuing will result in a considerable improvement in the arrangement and organization for the working of traffic." He admitted the jurisdiction of Parliament over mechanical apparatus like signals, and over public safety as involved in the question of hours of labor, but he thought that the published opinion of the Board of Trade censuring a particular company for negligence would arouse public sentiment on the subject sufficiently to accomplish the reform, leaving the details as now to the officers of the roads. The Parliamentary Committee has come to no decision, and probably will not for a year or more.

The review of the September earnings of the railroads, by the *Financial Chronicle*, shows continued gains. The increase in gross earnings and in miles operated, for September, as compared with the same month in the preceding year has been as follows for three years :

	1891. 140 roads.	1890. 151 roads.	1889. 144 roads.
Gross earnings, increase	$3,731,800	$2,973,989	$5,459,018
Per cent. of increase	9	7.3	10.3
Miles operated, increase	2,417	2,468	2,398
Per cent. of increase	2.8	2.8	3

Bradstreet's gives a gain in gross earnings of $3,504,333, or about 9 per cent. for 128 roads. The great source of gain has been among the grain carriers. *Bradstreet's* makes the increase on 16 granger roads, 12.8 per cent. Eastern and Southwestern roads show gains of 11 and 10 8 per cent. On 20 roads classed by the *Chronicle* as trunk lines, and Middle and Middle Western roads, the gain was 8 per cent. The receipts of wheat at Chicago are reported as 8,500,060 bushels this September, as against 1,500,000 last; and in corn receipts there was an increase of 2,500,000 bushels. The receipts at Duluth, Minneapolis, Toledo and St. Louis all tell the same story.

The Commissioners of the Western Traffic Association are endeavoring to prevent the lines of that Association from paying commissions on freight traffic, which it appears they are doing in violation of the provisions of the agreement. A circular has been issued couched in very specific terms and ending with a resolution "That any evasion or disregard of the foregoing requirement shall be regarded as contrary to the agreement of this Association and in violation thereof;" which reminds one of the vehement threat made by the innocent old countryman in the play who, when he had lent some money to the city sharper whom he met at the boarding-house, shouted after him as he disappeared, "If you don't repay this loan as promised, I shall—I shall—hold that you have cheated me out of it!"

The September traffic through the "Soo" Canal, though smaller than that for August, is decidedly larger than for September, 1890. The report shows:

Steamers	1,132	Freight tonnage	1,388,333
Sail and rafts	468	Passengers	3,598
Registered tonnage	1,356,836	Lockages	747

The increase in registered tonnage was 176,229, and in passengers 518, as compared with this month a year ago. The increase in coal carried up was from 285,407 to 351,517 tons, and wheat foots up to 5,928,840 bushels, compared with 1,184,105 bushels in 1890. Iron ore, however, aggregates but 621,316 tons, against 683,459 tons in September 1890.

The Fourth International Railroad Congress, which had originally been set down for September of this year, will, it is now announced, be held in June, 1892, at St. Petersburg. The first congress was held at Brussels in 1885; the second at Milan in 1887, and the third at Paris in 1889. Vienna has already been chosen as the place for the fifth congress, to be held in either 1894 or 1895.

NEW PUBLICATIONS.

Journal of the Iron and Steel Institute. No. 1, 1891. Victoria Mansions, London.

This volume contains the records of the Annual Meeting of 1891 held in May and the address of the President, Sir Frederick Abel, together with a number of valuable papers. One of the most interesting topics treated in the whole volume is War Material in the United States, by W. H. Jacques, which, with the discussion, occupies 72 pages. Another paper of decided importance and interest is on Tests of Steel for Artillery, by W. Anderson. The volume contains also the usual valuable notes on the progress of the iron and steel industries.

Journal of the Association of Engineering Societies. September, 1891. John W. Weston, Secretary, 78 La Salle street, Chicago, Ill.

The papers in this issue are on the Method of Determining the Capacity of a Water-works Basin, Recent Advancement in Electrical Engineering, Recent Great Developments in Steel Manufacture in the United States, the Choice of a Dynamo, and Cement Testing. The proceedings of the Societies and the Index to Current Literature also appear.

The Sextant and other Reflecting Mathematical Instruments. By F. R. Brainard, U. S. N. 18mo, 120 pages. New York: D. Van Nostrand Company. 1891. Price, 50 cents.

The engineer to whose lot it falls to make surveys of large areas, whether they are of a hasty and general sort or whether they are of a more refined character, will do a good deal of unnecessary work if he has not a good command of the sextant. The man who is really expert with this instrument knows that it is one of the most widely useful of any that have ever been contrived. Unfortunately, but little time or attention can be given to it in the schools, and most engineers go into the field with no conception of its capacity, and the chances are that they will never learn it. Mr. Brainard's little book (one of the Van Nostrand "Science Series") gives enough of the theory, adjustments and care of the sextant for the purposes of any engineer. Its practice, however, no one can give him. It is like the violin, one of the simplest and most flexible of instruments, about the hardest to learn and the most responsive to the skill of the man who handles it.

TRADE CATALOGUES.

The B. F. Goodrich Co., proprietor of the Akron Rubber Works, Akron, O., issues its latest pamphlet advertisement in the form of a "folder" such as the General Passenger Agents issue, and Mr. R. P. Marvin, Jr., appears as the "General Passenger Agent." The contents of the circular are chiefly humorous, though the reader is not left ignorant of the fact that air-brake hose, wire cloth, springs, steam packing, etc., are the principal things which it is intended to bring to his attention. With the true instinct of a G. P. A., Mr. Marvin lays special stress on the features for which he makes "no extra charge;" and he announces that baggage is checked, striped or plain.

TECHNICAL.

Manufacturing and Business.

The W. S. Hill Electric Co. of Boston has purchased from Mr. W. S. Hill all of his electrical inventions for electric motors, dynamos, lamps, switches, &c., and will manufacture these goods. The new men coming into the company are: George A. Denham, 56 Devonshire street; George H. Poor, formerly General Superintendent of the American Brake Co., at St. Louis and lately of the Boyer Railway Speed Recorder Co., at Chicago; George F. Gould, of Portland, Me., and Louis F. Busiel, Laconia, N. H. W. S. Hill is President; Mr. Denham, Treasurer; Mr Poor, General Manager; Louis E. Hill will attend to the manufacturing department. The office of the company is at No. 54 Devonshire street, Boston. Mr. Hill's present factory, at 133 Oliver street, will be enlarged.

The Lappin Brake Shoe Company has removed its offices from Aldrich Court to room 406 Welles Building, No. 18 Broadway, New York City.

The Delaware Iron Co., owned and operated by Morris, Tasker & Co., of New Castle, Del., has decided to rebuild the plant lately destroyed by fire, and has placed the contract with the Berlin Iron Bridge Co., of East Berlin, Conn., for the entire plant, which will be constructed of iron, from the designs of the Berlin Co. The work has to be completed by Dec. 1.

Mr. J. B. Mason, who has been for the last ten years connected with the Buda Car Works, and for the last five years as General Superintendent, has recently accepted a position with the Kalamazoo Railroad Velocipede & Car Co. as General Superintendent. The Kalamazoo Company is about to enlarge its plant to accommodate a rapidly increasing business.

New Shops and Stations.

In consideration of a bonus of $25,000 the Grand Trunk has promised to at once erect repair shops at London, Ontario.

The Canadian Pacific will shortly commence the erection of a new passenger station and a large grain elevator at Quebec.

The contract for building a passenger station for the Northern Pacific at Bozeman, Mont., has been let to G. M. Deeks, of St. Paul, Minn. The plans were prepared by Chas. E. Joy, and are for a handsome red brick building with brown stone trimings. All of the arrangements are completed and the plans indicate a station convenient for employés as well as passengers.

A contract for building a receiving freight house for the Great Northern in Minneapolis has been awarded to Fred Althen, of St. Paul. This building will be 43 x 417 ft. in dimension. The out freight house has just been completed. The dimensions are 43 x 600 ft. In connection with these an office building, 30 x 48 ft., is being built.

The Great Northern has under contract an additional building at the St. Paul shops, to be occupied by the chemical laboratory and the brass foundry, which the company will install as soon as the building is completed. The structure will be a one story brick one, 48 × 68 ft. in dimension, and is to be finished by Nov. 15.

The Great Northern shops at Great Falls, Mont., will be built on a site about one mile from the passenger station. The contract for building the first section of the plant has been let to James Carlisle & Sons, of Minneapolis, Minn., who are to complete the work this year The buildings under contract are machine, engine and boiler shop, 140 × 150 ft.; storehouse and office building, 40 × 100 ft., and a 20-stall roundhouse of the company's standard plan. All of these buildings are to be brick, with pitch and gravel roofs.

Car Heating.

The Canadian Pacific has recently ordered of the Consolidated Car Heating Co. 90 commingler equipments; the Boston & Maine, 65 equipments; the Old Colony, 50 equipments, and the Concord & Montreal, 35 equipments. With all of these the Sewell coupler is used.

Car Heating on the New York Central.

The controversy between the Martin Anti-Fire Car Heater Co. and the New York Central & Hudson River has been amicably settled. The road will continue to use the Martin system of piping in its cars.

Manchester Ship Canal.

Another section of the Manchester Ship Canal was formally opened on Sept. 29, and now the canal is navigable from the locks at Eastchaven for 11 miles, out of the 35, to Weston Marsh, about midway between Weston Point and Runcorn. As Weston Point is the port on the Mersey for the Weaver River navigation the canal boats from Staffordshire and the Midlands, which are too small to admit of their safely navigating the Mersey, can transfer their cargoes in the canal or the Weston docks to sea-going vessels, which could only reach that point in spring tides, instead of being required to lighter their cargoes to Liverpool. The salt traffic alone of Weston Point is over 1,000,000 tons per annum.

The next section, which will include Runcorn with a very heavy trade in chemicals, pottery and salt, will not be opened until some time next year, as the work on that section is in a very backward state.

The Franklin Institute.

In the programme for the season now about to open are lectures by Mr. Henry Pettit, recently General Superintendent Pennsylvania Railroad Division, P. R. R., on Japan and China, illustrated by photographs taken by himself: one by Mr. Courtenay DeKalb, mining engineer, on the Great Amazon, and one by Prof. L. M. Haupt, on the Port of Philadelphia. Mr. Eugene Griffin and Mr. Carl Hering will lecture on electrical subjects. Mr. W. L. Saunders, Mr. William Kent, Mr. A. E. Hunt, Mr. H. M. Howe, and Mr. Nikola Tesla are others whose names appear among the lecturers for the season.

Pintsch Gas in Ohio.

Dr. Norton, the Commissioner of Railroads and Telegraphs in the State of Ohio, has been making tests of the oil used in lighting cars running through that state. The law requires that it shall stand a flash test of 300 degrees. He found that many of the oils used would ignite at 120. The question raised by officers of the Pennsylvania lines whether or not cars lighted by Pintsch gas would comply with the Ohio law was referrred to Dr. Norton. After investigating the method of manufacture of the gas, and the qualities of the product, he recommends and encourages its use as being cleaner and safer than oil.

A Double Decked Electric Car.

A double-decked electric car, equipped with the Westinghouse motors, has been recently built at the shops of the Pullman Palace Car Co. at Pullman, Ill. The car is the result of the joint designing of E. C. Sessions, Oakland, Cal., and C. L. Pullman.

In general appearance the car resembles the double-decked vehicles in use in Paris. It is 32 ft. long, 7 ft. 4 in. wide, 14 ft. 9½ in. high and weighs 28,000 lbs. The car body has side doors like those of the cars of the Brooklyn Bridge, where there is a sort of vestibule from which spiral stairways lead to the upper deck. This entrance occupies but little space. The lower floor is thus divid-

ed into two compartments, each twelve feet long, with semi-circular ends, the seats being carried around the ends as well as along the sides.

The upper deck is covered with a canopy attached to the cab of the motor-man, which somewhat resembles the pilot house of a steamboat. The seating capacity of each deck is forty, thus giving the car double the capacity of the ordinary car now used in summer, while only three men are employed on this car as against four for the same seating capacity on two cars.

The car is equipped with an electric chandelier and double oil lamps in each compartment; it is heated by electric heaters, and in addition there is a novel contrivance in the shape of an electric diagram showing the seats that may be found vacant upon the upper deck.

There are two motors of the Westinghouse type of 25 h. p. each attached to the trucks at either end, which are of a special design.

Last week a party composed of some of the most prominent business men of Chicago went out to Pullman by a special train to witness a trial of the car. The exhibition was made on the experimental tracks west of the city, and the working of the car seemed to be satisfactory to those interested. It was under perfect control, starting and stopping easily and smoothly, In one case it was stopped in its own length from a speed of about 12 miles per hour. This was done to show the efficiency of the brakes, which were designed by H. H. Sessions. Naturally in such an exhibition as this no results were obtained that would indicate the amount of power consumed in actual street railway service, but the makers claim that the efficiency of the motors is high and that the power required is less per ton than where smaller cars are used. The new car is to be known as the Pullman Centre Vestibule Street Car, and is to be especially pushed in connection with the Westinghouse motors.

The Chignecto Ship Railroad.

The Secretary of this company writes to the London *Times* as follows, explaining the reason for stopping work: "There appears in your issue of to-day a quotation from the Montreal *Herald*, which is calculated to create an erroneous impression in the minds of shareholders and debenture holders of the company, and I am requested to ask you to give publicity to the following facts in connection with this undertaking. The contractors are under engagement to accept mortgage debentures of the company to complete the works. In the actual state of the money market it was deemed unwise to offer the remaining debentures for subscription. Application was made to the government for an extension of the time of completion, to July, 1893, which has been granted and all penalties waived. The contractors are awaiting a favorable opportunity for issuing the balance of the debentures, when the work will be proceeded with. The engineer on the spot expresses himself that the traffic receipts will be sufficient to cover working expenses and debenture interest, and to pay good dividends on the share capital without having to call on the government for any portion of the agreed subsidy of $170,602 a year."

THE SCRAP HEAP.

Notes.

The sixth annual convention of the Brotherhood of Railway Section Foremen was held at Detroit last week.

The Berner bill, passed by the Lower House of the Georgia legislature, imposing new and stringent restrictions on railroads, was killed in the Senate last week by a vote of 20 to 15.

The validity of the new Constitution of Kentucky is to be contested, on the ground that the Constitutional Convention made changes after the instrument was ratified by the people. Suit has been filed at Frankfort to enjoin the Public Printer and the Secretary of State from issuing copies.

The representatives of the Brotherhood of Railroad Conductors and Order of Railway Conductors, in conference at Cedar Rapids, Ia., have decided to consolidate both organizations under the name of the latter, and to work for the general federation of all train service organizations.

The suit of the State of New York against the New York, New Haven & Hartford to recover a $7,000 penalty for violation of the state car heating law, has progressed one stage further in the courts, and the decision against the company is again affirmed; but the road will doubtless appeal to the United States Supreme Court in order to have the question of interstate commerce settled.

Mr. J. S. Lane, who is well known in New England through his 33 years' connection with the roadway department of the New York, New Haven & Hartford, of which he was Roadmaster for some years, is now in business in Hartford, Conn. He is furnishing 28 car loads of stone daily from his quarries at Meriden, Conn., for ballasting on the four-track work on the New York, New Haven & Hartford road, and about 20 cars a day for macadam for city street use.

Foreign Notes.

On the fast German day trains, running between Bretten and Ulm, dining cars are shortly to be introduced. They will each have a dining room for 18 persons, a kitchen, and buffet.

According to the *Oesterreichische Eisenbahn Zeitung*, one of the results of the introduction of the zone tariff on the Austrian State railroads has been an increase of 43.45 per cent. in the number of of passengers carried during the year ended June 30, 1891, as compared with the number of the year which preceded. The increase in the receipts was 3.61 per cent.

Train speed trials have, for some time past, been conducted by the Belgian railroad authorities, with the view of shortening the running time between Cologne and Ostend. The maximum speed thus far recorded was 113 kilometers, or about 70 miles, per hour. Not satisfied with this, it has been concluded by the department to continue the trials with more powerful locomotives.

The seats for engineers which have recently been introduced on the locomotives of the Prussian State railroads have been eminently satisfactory, being so placed that the engineer, when seated, has a free outlook, and at the same time can handle the throttle and reverse levers. Better protection for the firemen has been secured by extending the roof of the cab further to the rear.

According to a system of electrically heating railroad cars, proposed by the two French engineers, Courcelles and Elu, lead gratings, suitably protected by a radiating covering, are to be fitted up in each car, and through these gratings an electric current from a dynamo is to be passed. The heat due to the electric resistance of the lead gratings, transmitted to the radiating surfaces, and then diffused over the car, is said to be sufficient to insure practical success. The dynamo is to be driven from the locomotive.

Fined for Running a Work Train on Sunday.

The Court of Appeals in Louisville, Ky., Oct. 13, affirmed the judgment of the Green County Circuit Court in assessing a fine of $900 and costs with interest against the Louisville & Nashville for running a construction train in Green County on a Sunday in 1887, and making repairs to the road which could have been done on any other day.

Assessment of the Illinois Roads.

The Railroad Committee of the Illinois State Board of Equalization assesses the railroads of the State $74,626,543, an increase of $1,987,157 over last year's assessment. The total mileage is 9,351, an increase of 87 miles. The committee has decided to assess the capital stock of the Pullman Palace Car Co. at $1,548,962. Last year the assessment was $1,573,335.

The Sudbury Mines in Ontario.

S. J. Ritchie, of Akron, O., who has already applied to the governments of Ontario and the Dominion for subsidies to aid in the development of the nickel and copper mines of Sudbury, Ont., has made the Board of Trade of Trenton, Ont., a proposition. He asks Trenton for a bonus of $75,000 with exemption from taxation. Mr. Ritchie says that the company will at once put the Edison method of reducing the iron ore into operation. The crushers are being built at Chicago and the plans being made for their erection at Coe Hill, where the ore will be pulverized and shipped at Weiler's Bay docks. Twenty-one crushers, capable of crushing 1,500 tons per day, will be built, requiring 1,000 men in the mines and about 500 men attending the machinery, producing 1,000 tons of prepared ore daily. Then the shipping of this ore will require a fleet of a dozen vessels.

Canadian Railroad Land Subsidies.

According to a return brought before the Dominion Parliament recently the total amount of land granted to railroads in the Northwest to date is 22,716,000 acres, excluding the grant of 18,000,000 acres to the Canadian Pacific. This is a total of 42,132,000. The question is now being considered as to whether it would not be better to aid railroads in the Northwest by cash subsidies.

Locomotive and Machinery Exports to Brazil.

The Bureau of American Republics is informed that since the promulgation of the reciprocity treaty with Brazil 128 locomotives have been sold in that Republic by the Baldwin Locomotive Works of Philadelphia, and in addition to this number 24 locomotives are now being loaded at Philadelphia for Brazil on the barkentines "Maggie Thompson" and "Eleanor M. Williams." Under the reciprocity treaty with Brazil locomotives and railroad supplies generally from the United States are admitted free of customs duty.

The Brazilians have always preferred American locomotives and our sale of both locomotives and rolling stock will probably be greatly increased in the future by the reciprocity treaty. During the four months from April 1, when the treaty went into effect, to Aug. 1 our exports of machinery to Brazil were valued at $874,104 as against $214,821 during the same period in 1890, and our exports of carriages and cars increased from $229,891 to $348,545. These were on the free list. Among goods on which there is a reduction of 25 per cent., when manufactured in the United States, the exports of hardware and tools increased from $56,466 to $88,205; and lumber and wood manufactured increased from $107,678 in 1890 to $320,776 this year. This shows an increase on the four items above mentioned of $1,058,774, or nearly 174 per cent.

Amused Himself with the Brake.

Everybody is familiar with that queer phase of human nature in accordance with which the discussion of a crime seems to be followed by numerous imitations of it. The dreadful railroad accident at St. Mandé, near Paris, in which thirty-two persons perished, was at one time supposed to have been caused by the cutting out of the Westinghouse brakes. Investigation has shown that this was not the cause, but at the same time as the possible cause of such an accident it was freely discussed in France. This has apparently begun to bear fruit, for we are told that a young lad has been arrested for turning a Westinghouse train pipe cock on a train of the Paris Ceinture (Belt) system. He explains that he did it to amuse himself.

Ohio Tin Plate.

For some time the Cincinnati Corrugating Co. has been making practical efforts toward the establishment of a tin plate works. Recently that company has shown a lot of terne plates produced at its Piqua works. It is a high grade of roofing plate of smooth and even finish. The sheet is of No. 30 gauge, corresponding approximately to an IC plate. This plate is said to be an American product throughout. The black plate was made from Bessemer steel billets manufactured at Middleport, O., and rolled by the Piqua Rolling Mill Co. The pig tin used in the coating came from the Temescal Mines, San Bernardino County, Cal., and the lead was from the Missouri mines. The manufacturers hope to turn out a still better plate as soon as the mill is equipped for cold rolling, which will enable them to put a better surface on the black sheet before tinning.

South American Railroads.

In order to facilitate the internal transportation in Bolivia the Government of the Republic is taking active steps to secure the construction of wagon roads and railroads, both by means of concessions to private parties and through the agency of the National engineers. A number of proposals for the construction of railroad lines have received the consideration of the Executive. Among these are: one from Gen. T. O. Osborn from Sucre to the Paraguay frontier; one by John Firth from Oruro, La Paz, to the Peruvian line connecting with the line from Arica and Tacna; one by Santiago Secombe from Aruro to Cochabamba, with an extension to Colquechaca; one by Agosto Stump, from Sucre to Huaicho. A concession has been granted to a London firm for a line from Pacheco on the Paraguay River to the City of Santa Cruz. The Department of La Paz has united with Peruvian authorities in the projection of a road to La Paz, which will connect with the line from Mallendo to Puno by the way of the Desaguadero. The railroad between La Paz and Uyuni is rapidly approaching completion and is expected to be open for traffic by the beginning of the year.

South American Railroads.

Notwithstanding the distressing financial condition of the Argentine Republic, Messrs. Walden & Co., representing a syndicate of British capitalists, have applied to the government for four railroad concessions, as follows: (1) A line from the new Saladaros or Abattoirs, near Buenos Ayres, to the centre of that city; (2) A line from Buenos Ayres to the province of Patagones; (3) A line from Buenos Ayres to Nueve de Julio, and (4) A line from Buenos Ayres to Rosario. Messrs. Walden & Co. propose to construct the roads without cash subsidy or guarantee of interest, but ask large grants of land. They deposit $100,000 as a guarantee of good faith, and agree to complete the system in four years. These railroads are intended to reach the salt lakes, coal mines, stone quarries, silver and copper mines and timber districts of the republic, and the contractors, having faith in the future prosperity of the country, believe that the present financial depression offers the best opportunity for cheap railroad construction, as they can obtain labor at low wages.

The Intercontinental Railroad.

The commissioners appointed to represent the United States on the Intercontinental Railroad Commission have submitted a report to Secretary Blaine of the progress made by the surveying parties in South and Central America on the line of the proposed road. The report states the engineers have met with a cordial welcome from the government officers of Ecuador and Guatemala, who have extended much assistance and detached engineers to accompany the surveyors. Some delay was occasioned, continues the report, owing, in part, to inadequate communication and transportation, in the assembling of the delegates from the distant republics in Washington last winter; and delay has occurred in the payment of the money due from several of the republics, Congressional action being necessary in each country. Congress appropriated $65,000 for the year ending June 30, 1891, and the same amount for the year ending June 30, 1892. Of this amount there was on Aug. 1, 1891, $56,910 remaining in the Treasury and available for use. Chili has paid in $3,000 and Columbia $4,000, their quota to the common fund, so that on Aug. 1, 1891, the commission had about $64,000 for carrying on the work. The expenses are estimated at about $2,000 for each party per month, and $1,000 for office and all other expenses, making about $7,000 for the total monthly outlay.

The report states that the work of the different surveying parties has been satisfactory, and rapid progress made. Lieutenant Macomb, United States Army, in charge of corps No. 1, reports that he is working toward the Mexican line, being encamped near Patulul. After completing the survey from Guatemala City to the Mexican line, he will return to Guatemala City and proceed southward with the survey through Central America. Mr. W. F. Shunk, in charge of the Second corps, reports that he left Quito June 3, and, although this is considered the most difficult part of the route, he made an average of about two and one-half miles per day, and at the time of writing was making about four miles per day. He estimates the average cost of the first 100 kilometres, for grading, masonry and bridges at $20,000, equivalent to about $32,000 per mile. J. Imbrie Miller accompanied Corps No. 2 as far as Quito, and then commenced surveying to the southward, toward Peru. Mr. Miller reports that he had reached Cuenca, 160 miles south of Quito, on Aug. 1; this is near the Peruvian boundary. He expects to make about 100 miles per month over the route.

Foreign Electric Railroad Notes.

Bremen, Germany, has found electric street railroad service so satisfactory that its present system is shortly to be extended by about four miles of new road. The Thomson-Houston International Electric Company has the contract for the work, and has orders also fit up a number of the street cars with electric lights. The municipal authorities of Paris have unanimously adopted the project of M. Berlier for an underground electric railroad, already referred to in a recent issue of *The Railroad Gazette*. The line is to be about 8½ miles long, and is to extend from the western outskirts of the city (Bois de Boulogne) to the eastern end (Bois de Vincennes). It is to run through a tube tunnel driven according to the Greathead system. Elberfeld and Barmen, two German towns, are to be connected by an elevated electric road, the contract for which is in the hands of the well known German electrical firm, Siemens & Halske, of Berlin. Russia is just beginning to appreciate the advantages of electric railroads, and the first line is now in course of construction at Kiew. A German firm, the Allgemeine Elektricitäts Gesellschaft, of Berlin, has the contract for the work.

LOCOMOTIVE BUILDING.

The Boston & Albany has let a contract for 25 engines to the Rhode Island Locomotive Works.

The Lake Shore & Michigan has let an order for 35 locomotives to the Brooks Locomotive Works.

The Baldwin Locomotive Works, Philadelphia, have delivered six mogul locomotives, of a order for 10, for the Atlantic Division of the Canadian Pacific. The engines have cylinders 18×24 in., six driving wheels 5 ft. in diameter, and will weigh about 48 tons each. They will be used for freight traffic between McAdam and Megantic. The engines are much larger than those in use on the road, and are supposed to haul 24 loaded cars over the heaviest grades.

CAR BUILDING.

The East Tennessee, Virginia & Georgia is in the market for freight cars.

There have recently been built at the shops of the Chicago, St. Paul, Minneapolis & Omaha at Hudson, Wis., 109 box and 20 platform cars. Work has been begun on an additional 100 box cars. There are also building at these shops several combination passenger, express and baggage cars.

The Lake Shore & Michigan Southern has let the following orders for cars: 10 passenger cars and two baggage cars to the St. Charles Car Co.; 20 passenger cars to the Barney & Smith Mfg. Co, 20 passenger cars to the Bradley Car Works, and 10 passenger cars to the Laconia Car Works; 500 box cars and 500 coal cars to the Peninsular Car Works, 500 box and 300 platform cars to the Wells & French Co.

The St. Charles Car Co. has recently received an order for two baggage cars for the Pittsburgh & Lake Erie and for two chair cars for the Toledo, St. Louis & Kansas

City. The chair cars will probably be as handsome as any of their kind now in service. The cars will have a buffet attached, and will be mahogany finish. They will have the improved Scarritt chair, upolstered in figured plush. The St. Charles Car Co. also has a contract for building 10 combination cars (baggage and passenger), 52 ft. long for the Lake Shore & Michigan Southern. The passenger compartments will be mahogany finish and upholstered in leather. These cars have a newly designed composite end, a piece of iron ¾ × 8 in., and the length of the end sill being put in end sill; a piece ½ × 5 in. put on end plate and on corner posts and door posts; a ⅜ × 3½ in. piece with ends twisted to lay flat on piece of iron in end sill and in plate and all riveted together. It makes the end very strong.

BRIDGE BUILDING.

Chattanooga, Tenn.—A $20,000 trestle bridge, 600 ft. in length, over the Cincinnati & Southern Railroad, at Highland Park, Chattanooga, Tenn., will probably be built.

Fairmont, W. Va.—At a special meeting of the County Commissioners of Marion County, W. Va., held last Friday, an arrangement was entered into between the county and the Monongah Coal & Coke Co., whereby a bridge is to be built across the Valley river in that county at a cost of $16,000, borne by the county and the company jointly. The bridge will be of three spans of 168 ft. each, with 16 ft. roadway and sidewalks, four stone piers 60 ft. high. The contract for the iron work was let to the Pittsburgh Bridge Co. Work will be commenced this fall.

Galveston, Tex.—A company will be organized at Galveston, Tex., by Walter Gresham, to build a railroad and wagon bridge to Galveston Island, for which the county will pay a yearly rental for the wagon way.

Senoia, Ga.—H. L. Freeman is inviting bids for building a bridge across the Line Creek, near Senoia, Ga.

Williamsburg, Ky.—Whitley County, of which Williamsburg is the county seat, will issue bonds for the construction of five iron bridges.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In the Federal Court it is laid down that as between two land-grant railroads, the definite location of the line of road under a later grant, if the road is finished, will carry all lands within the place limits which have not then been selected as indemnity lands under an earlier grant.[1]

In the State of Washington the Supreme Court holds that under the statute giving a laborers' lien upon a "railroad" or "any other structure," and the land upon which it is erected, laborers cannot have a lien upon a street cable railroad, since there can be no lien upon the land, the fee of the street being in the city.[2]

In Texas a railroad company proposed to extend its road to C. for a bonus of $25,000. Defendant signed a subscription list, binding himself to pay to the company $380.25 if its road should be constructed to C. within six months. A subscription list of only $23,000 was raised which the company rejected. Defendant then notified the committee in charge of the list that he withdrew his subscription. With knowledge of this withdrawal, the company agreed with the committee to construct the road for the $23,000 subscribed, and the road was built within the six months. The Supreme Court holds that defendant was liable for the amount of his subscription.[3]

In Texas the Supreme Court rules that by refusing to furnish cars on request, a railroad does not incur the statutory penalty for refusing to transport goods.[4]

The Supreme Court Court of Indiana holds that a railroad which has located a single track along a city street under an ordinance granting it the right to construct its railroad along the street within certain limits, and under general proceedings of appropriation in which damages were assessed to adjacent landowners, is not restricted to one track, but has the right to construct additional tracks if required by its business, if there is sufficient room to do so within the prescribed limits, without paying additional damages.[5]

In Louisiana the Supreme Court holds that so long as a railroad is permitted to retain the occupancy of granted lands, and to exercise the franchises it has thus acquired, and the grantor shall forbear to forfeit the grant, the corporation is entitled to proceed with the construction of its railroad to completion "out of time," and thus fulfill the condition subsequent that is attached to the grant.

Injuries to Passengers, Employes and Strangers.

In Texas the plaintiff was sitting on a box-car, which was standing in defendant's yard. An engine was attached to the car without his observing it, and the train was moved away. A person came to plaintiff, and ordered him to leave the train, using violent and threatening language, in consequence of which plaintiff leaped from the car while it was in rapid motion, and was injured. The Supreme Court decides, that it was proper to charge that if defendant's servant, within the scope of his employment, by peremptory order and threats, caused plaintiff to get off the car when it was dangerous to do so, defendant was liable.

The Supreme Court of Minnesota rules that the mere supposition or "general understanding" of its employés is not competent evidence of the existence of a rule of a railroad company.

In Alabama the Supreme Court rules that an employé at work under a car, who was injured by a collision between it and another car put onto the repair track by means of a running switch, may recover if the collision resulted from the engineer's negligence in imparting too great a speed to the cas in switching it onto the repair track.[9]

In Georgia, a railroad company is liable for injuries to an employé wholly caused by the negligence of a fellow servant, whether or not they are connected with the runing of trains.[10]

In Texas, the rails of a railroad were considerably worn, and in many places mashed, so as to make the track uneven. At one of such places a hand-car was thrown from the track, and a section-man injured. He had continued in the service some months with the knowledge of the general condition of the track. The Supreme Court rules that he had assumed the risk, though he may not have known of the particular defects which caused the injury.[11]

In Missouri it is held by the Supreme Court that two foremen of gangs of sectionmen working independently of each other, but under the same road-master, are fellow-servants, and where a collision between their hand-cars is caused by the negligence of one, and results in an injury to the other, the railroad company is not liable, though as to the men under him the negligent foreman is a vice-principal, and is engaged at the time of the accident in keeping the track in repair.[12]

In Georgia the Supreme Court holds that when a rule of the railroad stipulates that employés shall not be entitled to compensation for injuries, the regular compensation paid for services covering all such risks, and that all officers employing men "will have these conditions distinctly understood and agreed to by each employé before he enters the service," an employé whose attention is not called to the rule otherwise than by giving him the rule book containing it, is not bound by it.[13]

The Supreme Court of Minnesota rules that where a tool that is obviously defective is selected by a servant for certain work, though like tools in proper condition were furnished, which he might have used had he chosen to do so, the master is not liable to another servant working with him for injuries due to such defective tool, as such injuries result from the negligence of a fellow servant.[14]

In Missouri it appeared that plaintiff, who was familiar with the ground, stopped twice to listen on approaching the crossing—once at a distance of 120 ft. and again at 90 ft.; that he heard nothing; that he did not look, because a train would not be visible until he came within a few feet of the track. When he reached that point, his horses moving at a brisk walk, he looked to the west, and saw nothing, and looked to the east, and saw the train almost upon him, his horses being at that time nearly across the rails. He struck them to hurry them up, but the buggy failed to clear the track in time, and the injury ensued. The Supreme Court holds the railroad liable.[15]

In West Virginia, the Supreme Court rules that the failure of those in charge of a railroad train to blow the whistle or ring the bell at a public crossing, as required by law, will not of itself render the company liable for the death of a section-hand, who was not at the crossing, but was at work on the road some distance from it, and was there struck by the train and killed.[16]

The Supreme Court of the United States holds that the severing of a train of cars in the night time, leaving the rear portion of them uncontrolled otherwise than by ordinary brakes to make a running switch across a public highway at grade without any warning that they are approaching, is in such obvious disregard of the rights of a traveler on the highway, who attempts to drive across after the passage of the first section of the train, that the court is warranted in instructing the jury, as a matter of law, not simply that such facts are evidence of negligence, but that they constitute negligence.[17]

[1] Sage v. St. P. G. & T. F. R. Co. 44 Fed. Rep., 817.
[2] Front St. Cable Ry. Co. v. Johnson, 25 Pac. Rep., 1084.
[3] Buchel v. Lott, 15 S. W. Rep., 413.
[4] S. A. & N. P. R. Co. v. Bailey, 15 S. W. Rep., 203.
[5] C. St. L. & P. R. Co. v. Eisert, 26 N. E. Rep., 759.
[6] Mower v. Kemp, 8 South Rep., 8.0.
[7] Gulf, C. & S. F. R. Co. v. Kirkbride, 15 S. W. Rep., 495.
[8] James v. Northern Pac. R. Co., 48 N. W. Rep., 783.
[9] L. & N. R. Co. v. Davis, 8 South Rep., 552.
[10] Geo. R. & B. Co. v. Brown, 12 S. E. Rep., 812.
[11] Green v. Cross, 15 S. W. Rep., 220.
[12] Sherrin v. St. Joseph & St. L. R. Co., 15 S. W. Rep., 442.
[13] Georgia Pac. Ry. Co. v. Dooley, 12 S. E. Rep., 923.
[14] Hefferen v. P. R. R. Co., 48 N. W. Rep., 1.
[15] Kenney v. H. & St. J. R. Co. 15 S. W. Rep., 983.
[16] Christy's Adm'r v. C. & O. Ry. Co., 12 S. E. Rep., 1111.
[17] D. L. & W. R. Co. v. Converse, 11 S. Ct. Rep., 569.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Evansville & Terre Haute, quarterly, 2 per cent., payable Oct. 29.

Great Northern, quarterly, 1¼ per cent. on the preferred stock, payable Nov. 2.

Nashville, Chattanooga & St. Louis, quarterly, 1¼ per cent., payable Nov. 2.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atchison, Topeka & Santa Fe, annual, Topeka, Kan., Oct. 29.

Brandon & Southwestern, annual, adjourned, Winnipeg, Man., Oct. 26.

Chesapeake & Ohio, annual, Richmond, Va., Oct. 20.

Cincinnati, New Orleans & Texas Pacific, annual, Cincinnati, O., Oct. 19.

Cincinnati, Sandusky & Cleveland, annual, Sandusky, O., Oct. 21.

Cleveland, Cincinnati, Chicago & St. Louis, annual, Cincinnati, O., Oct. 28

Cleveland & Pittsburgh, special, Cleveland, O., Nov. 18, to vote upon a proposed issue of bonds.

Denver & Rio Grande, annual, Denver, Col., Oct. 20.

Evansville & Terre Haute, annual, Evansville, Ind., Oct. 19.

Kansas City & Memphis Railroad & Bridge Co., annual, West Memphis, Ark., Nov. 4.

Manhattan (Elevated), annual, 71 Broadway, New York City, Nov. 11.

New Orleans & Northeastern, annual, New Orleans, La., Nov. 4.

New York, New Haven & Hartford, annual, Stockholders' Hall, Union Depot, New Haven, Conn., Oct. 21.

St. Louis & San Francisco, annual, Broadway and Pine street, St. Louis, Mo., Oct. 27.

Western Maryland, annual, Baltimore, Md., Oct. 21.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* hold regular meetings at its rooms in the Gilsey House, New York City, at 2 p. m., on the third Thursday in each month.

The *Southern Railway Club* holds regular meetings on the third Thursday of the months of January, February, March, May, September and November at such points as are selected at each meeting.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of each month at 7:30 p. m. in the directors' room of the St. Paul Union Station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street New York

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month, excepting in January, when the annual meeting is held on the second Saturday of the month. The second January meeting is held on the third Saturday. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* hold regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursdays at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* hold regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month, at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 p. m. on the first Friday of each month.

Engineering Association of the South.

The first regular meeting of the Engineering Association of the South since the summer recess was held on Thursday evening, Oct. 8, in the Y. M. C. A. Building, Nashville, Tenn., the Cumberland Publishing House, in which are situated the future headquarters of the association, not yet being ready for occupation. Vice-President W. L. Dudley and President John B. Atkinson presided in turn, with about 20 members and visitors present.

The subject of the series of tests of American woods, recently inaugurated by the Department of Agriculture and now being carried out at St. Louis, Mo., and Ann Harbor, Mich., was discussed, and the Secretary was instructed to communicate with the Secretary of Agriculture, urging that the necessary appropriation of funds be secured for fully carrying out the series now undertaken

Mr. R. L. Cobb, Chairman of the Committee on Nomination of Officers, submitted the names of two nominees for each office to be ballotted for at the coming annual election in November. The following members were elected: Frank Cawley, Mechanical Engineer, and Benjamin W. Robinson, Mining Engineer, for the St. Bernard Coal Co., Earlington, Ky., and T. D. Kemp, Engineer and General Superintendent of the Improved Wood Pavement Co., Mobile, Ala. An application for membership was received from Lucien S. Johnson, Superintendent and Engineer of the Great Western Mining Co., Peach Orchard, Ky.

The paper of the evening entitled the "Estimation and Measurement of Earthwork" was then read by Mr. W. B. Ross, of Nashville, Tenn., member of the association. The paper, after a general analysis of the requirements and difficulties of earthwork estimation, presented a comparison of the several methods now in use for determining volumes, expressing the error of the several methods as compared with the geometrical rigorous prismoidal formula. One of the conclusions of the paper was that owing to the fact that earthwork excavations are usually bounded by a concave profile, either in the road bed

cuts or in borrow pits, the prismoidal formula gives results less than the actual volume taken out by an amount approximating to the error of the excess of method of "averaging end areas" and therefore the latter was believed to be the more accurate and just measurement of estimation than the prismoidal method, which while giving results rigorously true for the imaginary solid on which it is supposed to be applied still gives results too small when applied to the usual form of earth solid which is rarely a prism but usually has a middle section larger than that assigned it in the prismoidal treatment

The author presented for inspection some tables devised by himself for rapidly taking out the volumes of "three level" ground and also exhibited some graphical scales for the same purpose and to be used in finding the centre of mass of an excavation.

The next regular meeting of the association, which will be the annual meeting, will be held on Nov. 12, at Nashville, Tenn.

Engineers' Club of Philadelphia.

At the regular meeting on Oct. 3, President Wilfred Lewis in the chair, 39 members and three visitors were present.

Mr. John C. Trautwine, Jr., read a paper compiled from data furnished by Capt. Spencer C. McCorkle, upon "Land-locked Navigation from New York City to Charleston, S. C." The Secretary read a written discussion received from Mr. J. Foster Crowell, of New York. Mr. Crowell, from personal acquaintance with considerable portions of the proposed route, had, some years ago, been forcibly impressed with the extreme simplicity and feasibility of the plan. He has, in time past, contended that such
action as is contemplated by the proposed resolution memorializing Congress in behalf of the scheme is an entirely proper exercise of the Club's public function; and in the present discussion he submits, as a substitute, a preamble and resolution to the same general effect, but seeking to avoid the appearance of soliciting government aid for the civil engineering profession. The resolution, furthermore, confined its petition to the eastern portion of the route between New York Bay and the St. John's River, in Florida. The paper was discussed by Capt. McCorkle, Mr. Rudolph Hering and Mr. T. Carpenter Smith.

Mr. Hering, while believing that such a system of navigation would be of value chiefly to local traffic, and although not prepared to vote for the resolutions submitted, heartily endorsed the general project. The resolutions offered will be considered at the next business meeting. The subject for the evening, "Power Transmission," was then taken up. Mr. T. Carpenter Smith read for Mr. Saunders Morris, a paper on Electrical Transmission of Power.

The Secretary read, for Mr. Coleman Sellers, a letter communicating information obtained from recent letters from Switzerland respecting the electric transmission of power from Lauffen to Frankfort, a distance of 175 kilometers, or about 100 miles. A 300-H. P. turbine at Lauffen supplies power to a three-phase dynamo which furnishes currents of 65 volts, which are at once transformed to 25,000 volts and carried to Frankfort by a three-wire line, each wire having a diameter of four millimetres. The wires are carried by porcelain insulators with oil grooves, on wooden poles about 50 metres (164 ft.) apart. At Frankfort the high tension current is re transformed to an alternating current of 65 volts. This current has supplied 1,000 incandescent 16-C. P. lamps and a three-phase receiving dynamo of 100 H. P. From considerations of safety, the horse-power developed at Frankfort has not yet exceeded 120 H. P., and the tension actually used has not exceeded 15,000 volts, the quantity reaching only 1,500 ampères. The 100 H. P. dynamo furnishes at present only 40 H. P. to a centrifugal pump. Owing to the false indications given by ordinary ampère meters and voltometers, the number of watts recorded is greater at Frankfort than at Lauffen.

Mr. B. H. Coffey submitted a paper embodying a theoretical discussion of the "Effect of Centrifugal Force on the Transmitting Power of Driving Ropes." Mr. Carl Hering discussed the papers of Messrs. Morris and Sellers, from the standpoint of a recent visit to the scene of the Lauffen-Frankfort transmission.

Northwestern Track and Bridge Association.

A meeting of the Northwestern Track & Bridge Association was called to convene in the St. Paul Union Depot, Oct. 16. Important matters, arising from the connection of this association with the Roadmasters' convention, were to be considered. The subjects continued from the last regular meeting, to be discussed are: Mr. McGonagle's paper on "Preservation of Bridge Timbers," and a paper to be presented by Mr Rafferty on "Proper Foundation for a Right Angle Crossing."

Street Railway Convention.

A special Pullman palace sleeping car has been engaged to take delegates to the Street Railway Convention at Pittsburgh, and will leave Boston at seven o'clock Monday night, Oct. 19, 1891, via the New York & New England, foot of Summer street. The cost of this car is $45 per day and it will accommodate 26 people. The special fare of one and one third for the round trip makes it necessary for the holder to go and return via the same route, allows no stop-over on the return trip, and will cost about $24, besides putting the holder to considerable trouble in Pittsburgh. At the request of several parties who wish to return via Washington, D. C., the Secretary has arranged for a special round trip ticket, Boston to Pittsburgh and return, good to stop at Philadelphia and Steelton going, and returning via Washington, good to stop off at Washington, Baltimore, Philadelphia and New York, until Oct. 31. The price of this ticket is $31, and it will be necessary to make application for it in advance.

The Western Railway Club.

The Club will hold its October meeting at its rooms, Rookery Building, Oct. 20, at 2 o'clock p. m. The topics of the day are: (1) "Air Brake Practice," continued from the September meeting. All air brake experts connected with railroads and with air brake companies are especially requested to attend and participate in the discussion. (2) "Water Purification." Mr. J. N. Barr, of the C. M. & St. P. Ry., will read a paper on this subject.

PERSONAL.

—Mr. George W. Bistine has resigned as General Manager of the Erie Despatch, to take effect Oct. 31.

—Mr. Edward Harrington, the senior partner of the firm of Edwin Harrington, Son & Co., of Philadelphia, died at Bethel, Vt., last month, in the 67th year of his age.

—Mr. Hermann Laub has resigned his position as Assistant Engineer with G. Lindenthal, and has opened an office in Lewis Block, Pittsburgh, Pa., as Civil Engineer.

—Mr. J. C. Willis, of Metropolis, Ill., has been nominated by Governor Fifer to be Railroad and Warehouse Commissioner of Illinois, to succeed Mr. John R. Tanner, recently resigned.

—Mr. M. P. Kimball, President of the Pennsboro & Harrisville, Ritchie County, road, died at his home at Pennsboro, W. Va., this week. He was 68 years old and a prominent business man of West Virginia.

—Mr. John Woolridge, ex-President of the Eastern Railroad Co. (Massachusetts), died at Lynn, Mass., this week, aged 68 years. He was the first manufacturer to introduce steam as a motive power in shoe factories.

—Mr. Frederick J. Slade, the Treasurer of the New Jersey Steel & Iron Works, owned by Cooper, Hewitt & Co., died at his home in Trenton, N. J., last week, in his 49th year. He had been connected with the company 20 years.

—Mr. J. S. Leeds, ex-Traffic Manager of the Missouri Pacific, has accepted the position of Commissioner of a new traffic association about to be formed by the merchants of San Francisco.

—Mr. John McGee, who has been engaged in railroad and general engineering in the Argentine Republic for the past nine years, is in this country and may be addressed in care of R. L. Niles, 38 Broad street, New York. He will return in about three months.

—By the will of Mr. William C. Stroud, of the firm of Burnham, Williams & Co., proprietors of the Baldwin Locomotive Works, whose death occurred three weeks ago, the sum of $200,000 is bequeathed to found the Eliza Cathcart Home for Incurables, in memory of his mother, Eliza Cathcart Stroud.

—Mr. W. W. Currier, for the last eight years Superintendent of Transportation of the Rome, Watertown & Ogdensburg has resigned, his resignation taking effect Oct. 31. Before 1883, when he entered the service of the Rome, Watertown & Ogdensburg, he was connected with the New York & New England at Boston.

—Mr. A. R. Cavner died at Chicago, Oct. 12. He was Second Grand Chief of the Brotherhood of Locomotive Engineers, and was a prominent figure in the C., B. & Q. strike. The device for preheating air before admission to the locomotive firebox, as applied to an engine on the Chicago & Alton, which we illustrated last week, was invented by him.

—Col. C. C. Martin, Chief Engineer and Superintendent of the New York & Brooklyn Bridge, has finally decided to decline the presidency of the Rensselaer Polytechnic Institute, of Troy, N. Y., to which he was elected last spring. The trustees of the Brooklyn Bridge have increased the salary of the Chief Engineer from $6,000 to $8,000, and that of Assistant Chief Engineer Probasco from $5,000 to $6,000.

— Mr. Charles G. Hedge, who was elected Secretary and Treasurer of the Missouri, Kansas & Texas Railroad last July, has also been appointed Comptroller of that company. Mr. Hedge was at one time bookkeeper for the New York, Ontario & Western, Auditor of the Mutual Union Telegraph Co. before it was leased by the Western Union, and was for several years Assistant to the Second Vice President of Pullman's Palace Car Co. The office he now holds on the Missouri, Kansas & Texas gives him charge of the auditing and financial affairs of the company under the Chairman.

—Mr. John Hoey, President of the Adams Express Co., was dismissed from that position this week by the directors. He was also dismissed from the Board of Trustees, but is still a Manager, that office being an elective one. Mr. Hoey and Vice-President Clapp Spooner, who resigned after the President's deposition, are charged with malfeasance in connection with the sale to the Adams Express Co. of several small New England Express companies. Mr. Henry Sanford, who brought the charges against Mr. Hoey, has been elected President. The express company has not yet brought suit against either of the ex-officers.

ELECTIONS AND APPOINTMENTS.

Adirondack.—At the annual meeting, Oct. 14, the following Board of Directors were elected: R. Suydam Grant, James C. Hartt, Horace G. Young, James Roosevelt, Charles A. Walker, Robert Olyphant, David Willcox, Chester Griswold, William W. Durant, Warner Miller, William L. Strong, Freling H. Smith and F. Murray Olyphant.

Allegheny Valley.—A. B. Weed has been appointed division operator of the Low Grade Division, in place of George E. Armor, deceased. His office will be at Reynoldsville, Pa.

Baltimore & Ohio.—John E. Spurrier, for the last five years trainmaster of the Philadelphia division, has been appointed Assistant Superintendent of the Second division, with headquarters at Cumberland, Md.

Big Horn Valley.—The following is a corrected list of the incorporators of the company: William W. Dudley, Richmond, Ind.; Edward M. Dawson, Baltimore, Md.; Louis T. Michener, Indiana; Eben F. Crane and Norman F. Howe, New York; John W. Hobart, St. Albans, Vt.; Carroll T. Hobart, Red Bank, N. J., and John C. Sinclair, Philadelphia. There will be an office in the Pacific Building, Washington, D. C.

Boston & Providence.—At the annual meeting of the stockholders at Boston, Oct. 14, the directors were re-elected, with the exception of Joseph W. Balch, deceased, Edward W. Hooper being chosen in his stead.

Buffalo & Susquehanna.—The incorporators are: F. H. Goodyear, Austin, Pa., President; C. W. Goodyear, Buffalo, N. Y.; W. I. Lewis, Coudersport, Pa.; N. U. Metcalf, Wm. H. Sullivan, L. T. Johnson, Frank L. Blaisdell, Sanford H. Lewis, and E. O. Cheny, Austin, Pa.

Chesapeake & Ohio.—A. F. Stewart has been appointed Master Mechanic Cincinnati and Huntington Divisions, with headquarters Huntington, W. Va., vice William Hassman, resigned to accept position elsewhere.

Chicago & Eastern Illinois.—William Mosby, for several years Chief Clerk in the car service department of the Wabash, has been appointed Superintendent of Car Service for the Chicago & Eastern Illinois road.

Chicago & Southeastern.—The following directors have been elected by this new company: Charles S. Harris, L. G. English, E. A. White and S. R. Krofut, of Chicago, and Edward R. Colbrook, of Brooklyn.

Concord & Montreal.—The following directors were re-elected at the annual meeting of the company held at Concord, N. H., Oct. 13: Benjamin A. Kimball, John H. Pearson, John A. White and S. S. Kimball, Concord; Alpha J. Fillsbury and Charles E. Tilton, Tilton; Charles E. Morrison, Boston, Mass.; Lewis C. Pattee, Lebanon; Charles A. Busiel, Laconia; and Frederick Smyth, Noah S. Clark, Hiram N. Turner and Walter M. Parker, Manchester. At a subsequent meeting of the directors the following organization was effected: President, Frederick Smyth; Vice-President, B. A. Kimball; Clerk, F. S. Streeter; Executive Committee, John A. Busiel; Financial Committee, S. S. Kimball, C. E. Morrison and Walter M. Parker.

Georgia Midland & Gulf.—The annual meeting, recently held, resulted in the re-election of all the former directors and officers following: James E. Granniss, E. R. Lancaster, A. Illges, J. F. Flournoy, T. M. Foley, C. L. Davis, J. W. Alexander, Seaton Grantland and T. J. Pearce. President, J. E. Granniss; Vice-President, John F. Flournoy; and Secretary and Treasurer, T. C. S. Howard. G. Gunby Jordan was re-appointed General Manager.

Great Northern.—R. A. Wilkinson, Right-of-way Agent, having been transferred to the legal department, A. M. Scott has been appointed Right-of-way Agent.

Illinois Central.—At the annual meeting of the stockholders in Chicago, Oct. 14, Stuyvesant Fish, Edward H. Harriman and William Waldorf Astor were re-elected directors, and C. M. Beach, of Hartford, Conn., was elected to fill out the unexpired term of Director George Bliss, resigned.

Ives Branch.—The Connecticut company has elected as officers: Samuel C. Holley, President; Daniel Meeker, Vice-President; Edward M. Barntem, Secretary; Alfred N. Wildman, Treasurer, and as directors, C. H. Merritt, S. C. Holley, S. H. Rundle, D. E. Loewe, A. N. Wildman, W. Heckerle, D. G. Penfield, D. Meeker, E. M. Barnum, T. C. Millard, and B. A. Baugh.

Little Falls & Southern.—The stockholders elected the following directors at its annual meeting in St. Paul, Minn., Oct. 9: John A. Berkey, Peter Berkey, C. S. Bunker, M. M. Williams and E. O. Williams. The directors elected officers as follows: Peter Berkey, President; John A. Berkey, Vice-President; M. M. Williams, General Manager, and C. S. Bunker, Secretary and Treasurer.

Louisville, New Orleans & Texas.—At the annual meeting of the stockholders, held in Memphis, Tenn., Oct. 7, all of the former directors and officers were re-elected as follows: R. T. Wilson, C. P. Huntington, I. E. Gates, W. M. Johnston, E. H. Pardee and William Mahl, New York; J. M. Edwards, Memphis, Tenn.; E. Martin, Vicksburg, Miss.; and A. C. Hutchinson, New Orleans, La. R. T. Wilson, President; J. M. Edwards, Vice-President and General Manager; C. H. Bosher, Secretary, and F. H. Davis, Treasurer, both of New York.

Milwaukee, Lake Shore & Western.—W. A. Carleton has been appointed General Agent at Chicago to succeed C. L. Ryder, appointed General Passenger Agent. Mr. Carleton has been the agent of the company at Milwaukee.

Minneapolis & St. Louis.—The old directors were re-elected at the annual meeting in Minneapolis, Minn., last week, with the exception of R. R. Cable, who was succeeded by H. R. Bishop. The board re-elected W. H. Truesdale, President; A. A. Clarke, Vice-President, and James Gaskell, Secretary and Treasurer.

Missouri, Kansas & Texas.—C. G. Hedge has been appointed Comptroller and will, in addition to his duties as Secretary and Treasurer, have general supervision over all the accounts of the company, reporting to the Chairman of the Board or the Executive Committee. The General Auditor now reports to the Comptroller.

New York, Pennsylvania & Ohio.—The old directors have been re-elected, and the following officers: President, Charles E. Whitehead, of New York; Vice President, John Tod; Treasurer, E. R. Perkins; Secretary, E. Tupper; Auditor, J. T. Wann, all of Cleveland.

Norfolk & Carolina.—The annual meeting of the stockholders was held at Norfolk, Va., Oct. 9, and resulted in the re-election of the following officers and directors: President, Warren G. Elliott; Vice-President, H. Walters; Secretary and Treasurer, C. G. Elliott. Directors: William T. Walters, Warren G. Elliott, B. F. Newcomber, H. Walters, W. J. Doyle, H. C. Fahnestock and Calvin S. Brice.

Philadelphia & Reading.—F. W. Fowkes has been appointed Second Assistant General Freight Agent in charge of through traffic to and from points west of Buffalo and Pittsburgh; and W. H. Sleider has been appointed Freight Claim Agent to succeed Mr. Fowkes, promoted as above.

Richmond & Danville.—The resignation of Edward McIntyre, Comptroller of the Central Railroad of Georgia, has been accepted, and H. C. Ansley was on Oct. 1 appointed Acting Auditor in charge of the Comptroller's office.

Richmond, Fredricksburg & Potomac.—L. P. Ellis having, on account of ill health, retired from the position of auditor of this company, J. E Cox has been appointed to that office, with headquarters at Richmond, Va.

St. Paul & Duluth.—The annual meeting of the company was held in St. Paul, Oct. 9, and the directors whose terms expired, R. S. Hayes, Thomas Denny and E. W. Peet, were re-elected for three years. The following officers were also re-elected: President, R. S. Hayes; Vice-President, A. B. Plough; Secretary and Treasurer, G. G. Haven, Jr.; Assistant Secretary and Local Treasurer, W. H. Coleman.

San Antonio & Aransas Pass.—The Receivers on Oct. 9 officially announced the appointment of D. B. Robinson as General Manager. His headquarters will be at San Antonio, Tex.

Seaboard Air Line.—The headquarters of the following officers of the Atlanta Division of the Seaboard Air Line have been removed from Abbeville, S. C., to Athens, Ga.: T. W. Whisnant, Superintendent Atlanta

Division; H. W. B. Glover, Division Freight and Passenger Agent, and J. G. Williams, Auditor of Accounts, Georgia, Carolina & Northern.

Seaboard & Roanoke.—The following directors were re-elected at the annual meeting of the company, held in Portsmouth, Va., Oct. 6: Enoch Pratt, Louis McLane, R. C. Hoffman, Moncure Robinson, Jr., R. S. Tucker and L. R. Watts. John M. Robinson was re-elected President, and R. C. Hoffman, Vice-President.

Vicksburg, Shreveport & Pacific.—The company re-elected the old Board of Directors at its annual meeting at Monroe, La., last week. Charles Schliff was re-elected President, and C. C. Harvey Vice-President.

RAILROAD CONSTRUCTION.

Incorporations Surveys, etc.

Altoona & Wopsononock.—McAteer & Son, contractors, are now engaged in grading an extension of this road from Wopsononock, Pa., to the Richlands, a distance of three miles. The grading on this extension is about completed, and is ready for laying the track. A contract has been let to John Sellers & Co. for a further extension of this road from Richlands to Doughertys, a distance of two and a half miles. This will enable the company to enter the rich bituminous coal fields of Cambria County.

Baltimore Belt.—An exchange of property has been arranged between this company and the Northern Central at the new Bolton and Mt. Vernon yards in the northwest part of the city of Baltimore. This arrangement settles the only right of way dispute that was likely to delay the construction of the belt line. Ryan & McDonald have a considerable force working steadily on the open cut tunnel on the north side of Baltimore along Howard street. The tunnel is 8,300 ft. long, and it is reported that the brick work has been completed for over 4,000 ft. Most of the grading and masonry is now finished with the exception of the work on this tunnel. The line is seven miles long and extends from Hamburg street through the north part of the city to Bayview Junction, connecting the main line of the Baltimore & Ohio with its Philadelphia branch. There are four tunnels within the city limits, the three smaller ones being 570 ft., 450 ft. and 200 ft. long respectively. The bridge work includes one plate girder bridge with seven spans, varying from 55 ft. to 95 ft. in length, and also six plate girder bridges with spans from 50 ft. to 75 ft. in length.

Baltimore & Lehigh.—The company commenced the work of changing the present 3-ft. track to standard gauge last week. The road will be made standard gauge from Baltimore to York, Pa., a distance of 79 miles. The plans for this improvement were made over a year ago, before the reorganization of the Maryland Central, and the preparations for the change have been going on some time.

Baltimore & Ohio.—New surveys have been made recently for the proposed extension from Uniontown, Pa., southeast to Morgantown, W. Va., and reports of its early completion are renewed. The line will be about 20 miles long and is to be built to complete the proposed road between Pittsburgh and the West Virginia Central & Pittsburgh, near Elkins, W. Va. The grading was begun on this line this spring, but was suspended when a few miles had been graded. It is now expected that the work will be resumed and the line completed to carry out the agreement with the West Virginia Central & Pittsburgh for a new route over the Baltimore & Ohio from Beverly, W. Va., to Pittsburgh.

Bangor & Aroostook.—A meeting of the incorporators of the company was held in Bangor, Me., last week. The survey of the road has been completed to Millinocket Stream, six miles east of the crossing of the West Branch at Twin Dam. An excellent line has been found with good alignment and easy grades. The preliminary survey into Aroostook County is finished and a much shorter and more direct line has been discovered than was anticipated. In Aroostook County, on the eastern division, the final location has been made from Houlton to Westfield, Me., over 30 miles.

Beech Creek.—A large amount of work is reported to have been completed on the extension from Keer Moor south to Patton, Pa. The contractors are pushing the work energetically and nearly 700 men are reported to be at work on the line at present.

Brookline & Pepperell.—The charter for the Massachusetts division of this road was granted last week, the application having been approved by the State Railroad Commissioners after a hearing a few weeks ago. The line in the state will be about 10 miles long and the continuation of the line which is to begin at Brookline, N. H. The southern terminus will be at West Groton, Mass., on the Peterboro & Shirley branch of the Fitchburg. H. C. Winstow and Joseph A. Hall, of Brookline, N. H., are directors.

Buffalo & Susquehanna.—The company was incorporated Oct. 8 at Harrisburg, Pa. The road is to be constructed from Galeton, Potter County, to Cherry Springs, about 12 miles. The capital stock is to be $120,000. F. H. Goodyear, Austin, Pa., is President.

Calgarry & Edmonton.—Graders on this road are at work about nine miles north of MacLeod, in the southern part of Alberta. The rails are laid south of Calgary within four miles of High River, where there will be some delay waiting for the completion of the bridge. Arrangements have only been definitely made for the rails to reach Mosquito Creek, and the chances are that track laying will not be continued south of that point this fall.

Canadian Pacific.—Grading has been begun at Deloraine, Man., on the extension of the Southwestern branch, from that point northwest to connect with the Souris branch. The connection will not be made at Melita as at first proposed, but at Napinka, a point north of that town, on the Souris branch.

Central Arizona.—There is no very flattering prospect for the extension of this road, and the notice filed with the Secretary of the Territory of Arizona that the road will be extended from Lees Ferry to Nogales was a formality and to take advantage of a provision of a new law. The distance will be about 500 miles, but there is no work in progress, and indeed the capital is not organized to begin work. One of the branches, from Flagstaff to the Grand Cañon, about 65 miles, is the most probable of all the proposed branches to be built, and there is no work being done on it. Major D. M. Riordan, of Chicago, is the President of the company.

Chicago & Northwestern.—Bids for building 10 miles of second track south of Racine, Wis., on the line between Milwaukee and Chicago were opened this week The contract is understood to have been awarded to the firm of Kimball & McNamara. The Chicago line is already double tracked from Milwaukee to South Milwaukee, and for a number of miles north of Chicago.

Chicago & Southeastern.—This company has filed articles of incorporation in Illinois. The line to be constructed begins at the eastern terminus of the Toledo, Peoria & Western road, on the west boundary of the State, in Newton County, and will extend southeast to a point on the eastern boundary near Bethel. A line will also be constructed from a junction point in Parke County south to Brazil, to reach the coal fields. These lines will traverse the counties of Newton, Benton, Warren, Vermillion, Fountain, Parke, Clay, Montgomery, Boone, Hamilton, Madison, Delaware, Randolph and Wayne. The total length of the road is 230 miles.

Cleveland Belt & Terminal.—The formal transfer of the property of the old Cleveland Belt line to this company has been effected, and the deeds of transfer were filed at Cleveland last week. The new company will construct a belt line from a point on the Cleveland & Canton, between Broadway & Newburg, through Brooklyn, Rockport, Newburg, Warrensville, East Cleveland, and Euclid.

Coos Bay & Oregon Central.—Articles of incorporation have been filed in Oregon this week. The capital stock is $500,000 and the road to be built is from Gold Beach in Curry County on the Pacific Coast, near Marshfield, easterly to the Southern Pacific at Drain, Douglas County, north of Roseburg. The distance is 45 miles.

Duluth, Mesabi & Northern.—The grading has begun near the Artichoke River north of the St. Louis River. The clearing will not be completed on the 46 miles to the mines at Iron Mountain for two months. The road will be built directly by the company without contractors.

Duluth & Superior.—This company was incorporated in Duluth last week by directors of the Port Arthur, Duluth & Western, which is now being built from Port Arthur to the Minnesota boundary line. The new road is to be built from Duluth across Minnesota Point to Park Point, and to Superior City, and thence south to La Crosse, Wis. The right of way to Duluth and Superior City is reported to have been already partly secured.

Eastern Central.—This scheme is being brought into publicity again by a series of meetings being held in towns in Ohio, through which the road is to extend. It is designed to run from Pittsburgh to Chicago, parallel to the Pittsburgh, Fort Wayne & Chicago. The Ohio towns to be touched are Steubenville, Bowerston, New Philadelphia, Canal Dover, Millersburg, Galion and Bucyrus, and in these places meetings are now being held by the company to secure right of way and bonuses.

Great Northern.—The tracklaying is to begin this week on the line from St. Hilaire, N. D., south to the Fosston branch. The grading has been completed for eight miles and the connection at Dugdale with the Fosston branch will probably be made early in November.

It is reported that surveyors are running a line for an extension of the Wadena & Park Rapids branch from the northern terminus of that line northeast through Hubbard and Becker counties, Minn., toward Fosston, to complete a cut off to St. Paul.

About 200 miles of the Pacific extension has been completed and the work is well down on the western slope of the Rocky Mountains. This line is being pushed forward as rapidly as possible. So far no heavy tunnel work has been necessary, although there are a number of short ones. It will require a longer one to pass the Cascades, just how long has not been determined yet.

Great Northwest Central.—The official notice is given that Alphonse Charlebois, lately contractor for building this line, has ceased to have any connection with the company, and that, having failed to complete his contract, the High Court of Justice has by its judgment taken the road out of his hands and allowed the company six months to complete the work. The company will proceed at once to put the road in order and operate the same.

Great Salt Lake & Hot Springs.—The tracklaying on this suburban line north of Salt Lake City will probably begin this week. The contractors expected to begin the work Oct. 15. The grading on the line north of Salt Lake City has been finished for about three fourths of the distance to Great Salt Lake, and the work is under way on the last three miles to Centreville. Surveys have been made from the latter town to Farmington and other points. The line now under construction is 12 miles long. S. Bamberger is President and Manager, and H. S. Joseph, of Salt Lake City, is Chief Engineer.

Great Western.—A cablegram has been received by the local officers of the company at Salt Lake City, announcing that part of the securities have been negotiated in London to complete the first division of the line. The bonds were placed through D. R. Brewer, of New York City, who agreed to sell two-thirds of the proposed issue of $3,000,000 if he received the contract for building and equipping, for $18,000 a mile, the 170 miles of the road west of Salt Lake City to the Deep Creek mines, in Nevada. James H. Bacon, of Salt Lake City, is President.

International (of Mexico).—Articles of association were presented to the Massachusetts Railroad Commissioners this week by the International Railway Co. (of Mexico) limited, formed for the purpose of building a railroad through Mexico from Matamoras, at the United States frontier, to some point on the frontier of Guatemala, with a branch from near Tuxpam, State of Vera Cruz, to the City of Mexico. The capital stock is to be $1,000,000, and the temporary directors are William A. Paine, Thomas W. Pierce, Feliciana San Roman, Demetrio Salemar, Enrique Vizaya, Franklin B. Brown, Joseph S. Anthony, Jacob M. Cropley and George H. Towle.

Ives Branch.—New York and Connecticut capitalists met at Danbury, Conn., several days ago, and completed the organization of a company to build a road from Danbury westerly to the New York State line, to connect with a short branch to extend from the Harlem Railroad at Golden's Bridge, near Katonah, in Westchester County.

Kentucky Midland.—The proposition to subscribe for $100,000 of the capital stock of the company, submitted to Stirling County, Ky., was voted on last week and carried. The county bonds will be issued for $60,000 when the road is completed from Paris, Ky., to Mount Sterling and $40,000 when built to a connection with the Kentucky Union, near Clay City.

Kewaunee, Green Bay & Western.—On the main line of this road between Green Bay and Kewaunee, Wis., 25 miles of track had been laid up to Oct. 9, and the ballasting completed for part of the distance. The road will probably be completed and opened for business Oct. 26. The main line is 33 miles long. The stations are New Franklin, 10 miles from Green Bay; Luxemburg, 16 miles, and Clyde, 23 miles. A branch has just been put under contract from Luxemburg to Ahnapee, on Lake Michigan.

Little Falls & Dolgeville.—The contract for the completion of the construction of the road extending from Little Falls to Dolgeville, N. Y., a distance of some 10½ miles, has been let to the firm of Godeffroy & How, of 45 Broadway, New York, who have recently completed the construction of the Baltimore & Eastern Shore, a distance of some 106 miles. The work for the New York road is very heavy, as there is a great deal of bridging and some very heavy rock cutting. The address of the firm for this work will be Little Falls, N. Y., where Mr. Francis How will personally superintend the construction of the road.

Manganese Coal & Iron Co.—A branch road about five miles long will probably be built by this company from Newcastle, Va., on the Chesapeake & Ohio, up Craig's Creek, to the mines owned by the company. When completed the line will probably be operated by the Chesapeake & Ohio in connection with the Craig's Valley division recently built.

Mattawa & Temiscamingue.—A number of men left Ottawa last week to work on this road. The work was begun on the Quebec shore, directly opposite Mattawa, Ont. The company has decided to build a road through to Lake Temiscamingue, Que., and has obtained a charter for that purpose. The line when completed will be 60 or 70 miles long, and will be a great convenience to lumbermen.

Mexican Roads.—The Mexican Government has just granted a concession for a standard gauge railroad about 350 miles long from the City of Mexico to a town on the Pacific coast now known as Palizada Bay, and the letting of the contract will take place during the present month. The road will traverse a rich mineral section of old Mexico, which produces silver, gold and lead ores and has also large agricultural and timber resources.

Middle Georgia & Atlantic.—The Seaboard Company, of Savannah, which was organized to complete this line between Savannah and Atlanta, has decided to postpone until next year the award of any further contracts for constructing the road. Under the old management nearly the entire line was located last year, but the route surveyed then will probably not be adopted by the new company. Its engineers have made a preliminary survey for about 40 miles northwest of Savannah to Statesboro. The route will probably pass through or near the towns of Statesboro, Swainsboro, Tennille, Sandersville, Eatonton, Machen and Covington. The maximum grades on this line it is believed will not exceed 66½ ft. per mile. There will be three long iron bridges; one 430 ft. long, over the Savannah River; a 130-ft. span over the Ogeechee River, and two 100-ft. spans over the Oconee River. Eighteen miles of the line is operated between Machen and Eatonton and 25 miles more has been graded between Machen and Eatonton. Arthur Pew, of Savannah, is Chief Engineer.

Minneapolis, Str Paul & Sault Ste. Marie.—The extension from Hankinson to Valley City, N. D., 80 miles, recently completed, was opened for traffic this week. It will be designated as the Sheyenne division and may be ultimately extended northwest to a nearer connection with the Canadian Pacific, near Regina, N. W. T.

Mobile & Girard.—The extension which is being built south of Troy to Andalusia, Ala., is still under construction. The work is now going on rapidly and the Van Kirk Land & Construction Co. expects to have its contract finished in a few weeks. The track laying was begun in the spring, but the progress of the work has been very slow and is not yet completed.

Montana Central.—The Neihart branch, which is being built to the mining camp in the Belt Mountains in western Montana, south of the Missouri River, will probably be completed this month. The grading has been completed for the 12 miles from Monarch to Neihart and the track laid for several miles.

Navesink.—This is the corporate title of the new branch of the Central of New Jersey to Atlantic Highlands. The line will be about four miles long, extending from Atlantic Highlands to Highland Beach, N. J., and is to be built to replace the road on Sandy Hook peninsula, which has been abandoned. The surveys of the line have been completed, and proposals for constructing it are now being received. There will be one drawbridge 275 ft. long over the Shrewsbury River. The maximum grade of the new line is 13 ft. per mile and the maximum curves four degrees.

New Roads.—The standard gauge road being built by the Tyler Star Lumber Co. from Gilmer, Tex., through Upshur County, has been graded for four miles and the track partly laid. The line will be five miles long.

Northern Pacific.—The extension of the Northern Pacific & Idaho road from Pullman has just been put in operation as far as Juliette, Idaho, near the northern boundary of the Nez Perces Indian Reservation and north of the Water River. About 40 miles of this line is now in operation from Pullman, Mont. The line extends easterly through Moscow and Cornwall, south through Kendrick and thence southeast through Juliette to Lewiston. The branch has been in operation to Kendrick since early in the summer and it is expected to have it completed to Lewiston this winter.

The double track between Puyallup and Tacoma, about nine miles, is now being operated to a point within two and one half miles of Tacoma. The second track was begun some months ago by Griggs & Heustis, of Tacoma, but the work has been very difficult, and a large cut near Tacoma now delays the completion of the work. The building of a second track will materially aid the movement of traffic on this division. In September 432 cars arrived in Tacoma daily from the East. About 110 car loads of wheat are now being delivered daily at Tacoma.

Pennsylvania Co.—The improvements which the company is making on the roadbed of its Eastern division in the immediate vicinity of Allegheny, Pa., will be completed next month. The amount expended will be about $100,000. The principal work is building 2½ miles of track between Jacks Run and Emsworth, which will complete the third track from Allegheny to Glenfield.

Rio Grande Gunnison.—An officer writes that the line which this company is building is practically an extension of about 10 miles of a branch of the Denver & Rio Grande, north of Wagon Wheel Gap, Col., and will be operated in connection with, and probably by, that company. Certain business considerations prompted the building of this short line under separate organization.

Rio Grande Southern.—President Otto Mears spoke interestingly of the work on this road last week on its completion to Rico. He said: "We now have 75 miles in operation on the north end of the line, and 25 miles on the southern end from Durango to North Mancos, Col. Beyond North Mancos, toward Rico, we have 55 miles graded, leaving only 16 miles yet to grade to complete the grading of the entire line. This gap of 16 miles will be finished in about 60 days, and by Dec. 1 we expect to have the road finished, so that trains can run clear through to Durango. The rails are being laid every day now, and I know of no obstacles in the way of carrying the work along rapidly. It is pretty certain that before the first of the year the entire line and all its branches will be in operation. When finished, the road will have cost nearly $5,000,000. In places this road has been very difficult to build. Between Illium and Rico, I think that beyond all question it was the most difficult piece of railroad construction ever attempted in this country, on account of the great amount of heavy stone and bridge work. At one point where the road is going around by Ophir to Trout Lake between the high cliffs, it makes a loop, and the timbers for the bridges on the upper track had to be drawn up 100 ft. by ropes.

Seattle & Montana.—About 10 miles of track has been laid in the last week north of the Stillagaumish River to connect the unfinished section between the river and Stanwood, Wash. The last track was laid Oct. 12, three miles south of Stanwood, completing the road between Seattle and Jarmins Ferry, where the road connects with the Fairhaven & Southern. The line is 84 miles long, and by its connection with the Fairhaven & Southern completes a line along the coast of Puget Sound between Seattle and New Westminster, B. C. The line will not be opened until early in November, as it will take until that time to complete the ballasting.

Southern Pacific.—Work on the bay shore line from San Bruno, in San Mateo County, Cal., referred to last week, is in progress between San Bruno and the hills. A large force of men is grading and excavating and some tunneling has been done. The completion of this road will result in materially shortening the time between San Francisco and coast division points.

The common council of Redlands, Cal., last week granted the company the right of way through that town for the proposed extension of the San Bernardino rapid transit line, recently purchased by the Southern Pacific.

Syracuse & Oneida Lake.—This company was incorporated in New York last week with a capital of $125,000. The company is formed for constructing a standard gauge road 12 miles in length, in Onondaga County, from Messina Springs, connecting with the Syracuse, Eastwood Heights & Dewitt Road, thence northerly through the towns of Dewitt and Cicero to a point near the south shore of Oneida Lake.

Texas, Louisiana & Eastern.—Subcontractors under Kennedy & Stone are now working near Conroe, Tex. Under a previous contract about four miles of the grading had been finished and 20 miles additional are now under way. The tracklaying has not yet begun, but the rails for the first five miles have arrived at Conroe and the work will begin this week, with the expectation of having the track laid on the first 20 miles early in December. W. C. Beach is Chief Engineer.

Trinity, Cameron & Western.—Capt. John O'Neill, the Chief Engineer, has just completed the reconnaissance of the line between Cameron and Trinity, Tex., and will begin the preliminary survey at Cameron at once. He is now organizing the surveying corps.

Wilmington & Weldon.—The grading has just been commenced on the branch to Washington. The extension is from the crossing of the Scotland Neck & Greenville road and the Albermarle & Raleigh, easterly to the southern terminus of the Jamesville & Washington road on Pamlico River. As stated last week, the grading will probably be done by the North Carolina State Penitentiary and probably this is the only contract for work on the construction of the line which will be let.

Wrightsville & Tennille.—The trains of this company are now running into the new station at Wrightsville, Ga., the bridge over the Oconee River having been completed. The terminus of the line has heretofore been on the east bank of the river, but the tracks are now laid through Wrightsville and it is expected will be laid this year some miles beyond that town toward Abbeville. The survey has been made for the 40 miles to that town, and considerable grading completed on the northern portion.

GENERAL RAILROAD NEWS.

Allegheny Valley.—In the United States Circuit Court, at Pittsburgh, Judge Acheson has made an order for the sale of the road in 60 days. The order is the outcome of the suit entered in 1884 by the Pennsylvania R. R. against the defendant company for failure to pay interest on its bonds. The order is made under the terms of the decision rendered on Aug. 31, which will finally put an end to the old litigation over the property. P. A. B. Widener, R. D. Barclay, and John B. Jackson have been appointed a purchasing committee to buy in the road at the sale. The decision of the Court makes a prior lien of the $4,000,000 first mortgage, the $10,000,000 low grade division first mortgage and the $1,800,000 bonds of 1870, held by the State of Pennsylvania. It is proposed to issue $20,000,000 four per cent. 50-year bonds, guaranteed by the Pennsylvania R. R.; $15,000,000 cumulative three per cent. first preferred stock; $8,000,000 non-cumulative three per cent. second preferred stock, and $5,000,000 common stock. Of the $20,000,000 bonds to be issued, $17,100,000 are to be reserved for the prior liens as they mature, $400,000 are to be issued to the Pennsylvania, the Northern Central, and the Philadelphia & Erie, in part settlement for their claim as guarantors for the state loan and $1,250,000 to the individual income bondholders and stockholders, who are assessed 10 per cent. The balance will be held in the treasury. Of the $15,000,000 of first preferred stock, $10,000,000 will be issued to the Pennsylvania for its payments made in purchasing the low grade division interest. $4,500,000 will be issued to the individual holders of income bonds and $400,000 to the Pennsylvania, Northern Central and Philadelphia & Erie roads, the balance due on account of their expenditures as guarantors of the state loan. The balance of the first preferred stock will be held in the treasury. There will be issued $8,000,000 of second preferred stock, of which $7,000,000 is to go to the Pennsylvania Railroad, $600,000 to the Philadelphia & Erie and $200,000 to the Northern Central for their holdings of income bonds. The common stock will be increased to $5,000,000, of which $2,500,000 will be issued to present stockholders, and the balance reserved in the treasury. The $1,250,000 derived from the assessment will be held to make whatever cash payment is required at the sale, and expended in paying off certain claims which must be discharged before the receivership can be terminated.

Atchison & Nebraska.—Judge Ames, of Lincoln, Neb., referee in quo warranto proceedings, instituted in the Nebraska Supreme Court several years ago to forfeit the charter of the railroad because it had consolidated with the parallel and competing Burlington & Missouri, on the ground that the union was unconstitutional, has reported against the dissolution of the charter. He says rebates existed on both roads before and after consolidation, while the consolidation was not unconstitutional. The referee concluded that, owing to the building of new competing lines in that territory, and from the fact that the line if operated independently would be utterly destroyed as an instrument of commerce, the court ought to refuse a judgment of ouster.

Baltimore & Ohio.—Speculations as to the possibility of a dividend either in stock or cash being declared at the approaching annual election, have engaged some attention during the summer. A banking firm of Baltimore has declared that a stock dividend would be voted. Last week they stated that the amount would be $10,000,000, and that the stock is to be appropriated as follows: As a dividend to present stockholders, $3,000,000; to the Pittsburgh & Western, $2,000,000; for extensions and betterments, $5,000,000. According to the statements issued the company has in the last two years earned above fixed charges nearly 10 per cent. per annum on its capital stock, which amount is claimed to have been spent in other than ordinary expenses, and to reimburse the stockholders it is now proposed to divide among them 20 per cent. in stock.

Chicago & Erie.—Reports that the New York, Lake Erie & Western had sold part of the bonds of this company that it had held, have been denied. The company has had various overtures for the purchase of the bonds, but it is unwilling to sell them at these prices, preferring to wait to see the earning power of the property before disposing of them. The company holds $5,000,000 of these bonds.

Cincinnati, Jackson & Mackinaw.—The foreclosure sale at Toledo, O., resulted in the sale of one of the two divisions to the income bondholders who have opposed the plan of reorganization formulated by the Reorganization Committee, and the proposed lease to the Cincinnati, Hamilton & Dayton. The Northern division was bid in by the Reorganization Committee for $2,500,000. The middle division, covered by Cincinnati, Van Wert & Michigan first mortgage bonds, was sold for $1,642,000 to J. A. Rice, of Akron, O., and others. The Reorganization Committee does not believe that this bid was made in good faith, as it is at the rate of $20,000 a mile. The Committee had offered this division to General Rice for $1,367,000, the amount of the bonds with accrued interest, but this was refused. The result of the sale will cause a delay of at least 20 days in the reorganization. The Committee says: "The disaffected income bondholders represent $238,000 out of the entire $363,000 of income bonds. The remaining $125,000 approved the reorganization plan. These bonds never paid a cent, but we offered the holders the equivalent in stock in the new organization." It had been arranged by the Committee that after the road was bought in it should be leased to the Cincinnati, Hamilton & Dayton, which was to guarantee, by indorsement, principal and interest of $1,800,000 50-year four per cent. gold bonds.

Cleveland, Cincinnati, Chicago & St. Louis.—The company reports for the year ending June 30 last:

	1891.	1890.	Inc. or dec.	
Gross earnings.....	$13,173,315	$12,962,307	I.	$211,008
Operating expenses.	8,806,874	8,373,417	I.	433,457
Net earnings.....	$4,366,441	$4,588,890	D.	$222,449
All charges.....	2,990,620	3,105,545	D.	114,924
Balance.....	$1,375,821	$1,483,345	D.	$107,524
Div. on pref. stock..	500,000	500,000		.....
Balance	$875,821	$983,345	D.	$107,524
Div. com. stock.....	818,321	*820,000	D.	1,679
Surplus.....	$57,499	$163,345	D.	$105,845

*4 per cent.

During the year the freight tonnage was 7,801,377 tons, 89,539 tons less than the previous fiscal year, and the rate per ton per mile was, .683 cent, a decrease of .011 cent. The company charged to construction and equipment account $571,316, and paid it with various securities in the treasury. About $500,000 of the common stock in the treasury will be sold for shops and sidings this year. The company will pay for 1,200 new cars and 20 locomotives in 120 monthly notes, charging the same to expense account. The company owes $470,000 for cars, $110,000 for land at Cairo, $2,177,944 bills payable, and $800,000 debt of the Cincinnati, Wabash & Michigan Railroad. Against these it has first mortgage bonds sufficient to pay the debts. The fixed charges this year will be about $2,500,000. The increases in liabilities last year were $6,747,305 common stock, $21,193,730 bonded debt, issued for new road and additions to plant.

Columbus, Hocking Valley & Toledo.—The directors have decided to issue $2,500,000 five per cent. preferred non-cumulative stock and to offer to the stockholders at an early date for subscription $2,000,000 of it at $50 a share. Each stockholder will be entitled to subscribe for 17 per cent. of his holdings payable in regular installments. Stock not taken by the stockholders will be taken by a syndicate at the same price. The stock is issued to take up $777,000 seven per cent. bonds which fall due Jan. 1, 1892, and to provide for maturing car trusts which have heretofore been met out of surplus earnings. These car trusts amount to about $220,000 a year. In exchange for the old seven per cent. bonds the company will be entitled to receive from the trustee of the consolidated mortgage and an equal amount of five per cent. bonds which will be canceled. The proposed plan effects a reduction of about $200,000 in the present charges ahead of the common stock. A meeting of the stockholders will be held Nov. 12 to ratify this action.

Concord & Montreal.—At the annual meeting of the stockholders in Concord, N. H., this week, it was voted to increase the capital stock from $4,800,000 to $6,000,000 in 12,000 shares, to be issued to all stockholders at par. Some stockholders protested, claiming that the action is inequitable and illegal, and that the new stock, if issued, should be offered only to the old Concord road stockholders. Legal proceedings are to be instituted to prevent the increase of the stock. The contract with the Pemigewasset Valley Railroad to extend its line was ratified.

Gettysburg & Harrisburg.—The directors have recently executed and placed on record a mortgage for $565,000 to the Guarantee Trust & Safe Deposit Co., of Philadelphia. The line was recently bought by the Philadelphia & Reading, and extends from Carlisle to Gettysburg, Pa.

Illinois Central.—The following abstract is from the annual report for the year ending June 30: The gross earnings for the year were $17,881,554; increase over 1890, 8.69 per cent., or $1,452,022. Net earnings, $5,120,508; decrease from 1890, 3.36 per cent., or $178,094. Dividend paid, 5 per cent. on $45,000,000, or $2,250,000. Carried forward to surplus fund, $210,926. The proportion of the gross revenue paid to the state of Illinois in lieu of taxes amounted to $520,949. The largest sum paid any previous year was $496,489 in 1865. Of the $5,000,000 of stock offered to the stockholders for subscription Nov. 1, 1890, there was taken $535,450. During the remainder of the fiscal year there was sold $961,325, making the sum realized from this source previous to June 30, $1,496,775, and leaving in the treasury of the company $3,503,225. Of this there has been sold since June 30 $2,100,000.

International & Great Northern.—Another effort is to be made to complete the reorganization of the railroad. The directors approved a new plan, and with the assent of the stockholders it will be offered for consideration to the bondholders. The stock is held equally by Jay Gould and the Missouri, Kansas & Texas Railroad. The acceptance of the plan will prevent foreclosure, and result in a speedy return of the property to the company from the hands of the Receiver. The bondholders have objected to the plan proposed by the stockholders that the unpaid coupons on the first and second bonds be funded. The new plan of reorganization, now offered to the bondholders, provides for the funding of these coupons over which the dispute has lasted. Half of the claims of the first mortgage bondholders will be paid in cash and half in a preference bond. The second mortgage bondholders will receive their proportion in preference bonds, but no cash.

Lake Erie & Western.—The annual report gives the mileage of main line and branches as 752 miles, of which 667 miles are laid with steel rails. Rebaliasting with gravel is needed on about 200 miles, and there are 250 miles which have no gravel or other ballast than soil. The physical condition otherwise is excellent. The company has no car trusts. Between Feb. 1, 1887, and Aug. 1, 1891, the company has expended $1,536,725 for betterments out of surplus earnings. The report says: "The wisdom of this liberal expenditure is proved in the operation of the road by the immunity from accidents and the low rate of expenses to earnings (58.51 per cent.) attained in the face of a continuous decline in rates." During the year 1890 there was added $1,700,000 to the cost of the road; $219,893 to equipment, and $77,000 for debts and improvements, making a total of $1,996,893, including the cost of the Fort Wayne, Cincinnati & Louisville road (133 miles) and its equipment, acquired in June of that year. For this purpose $1,330,000 first mortgage bonds were issued, the remainder of the purchase mainly being paid from the surplus and by a temporary loan of $360,000, of which $50,000 has since been paid out of the excess of earnings of the road bought over the interest on the bonds issued therefor. Beginning with February, 1890, the company has paid seven consecutive quarterly dividends of 1 per cent. each, aggregating $828,800. The gross earnings for the eight months ending Aug. 31, 1891, show an increase of $90,054 over the corresponding period of 1890, in spite of labor troubles now settled and with little or no benefit derived from the abundant crops of this year. A conservative estimate puts a surplus of $845,000 for 1891. This, if so applied, would give a dividend of 6 per cent. on the preferred stock and leave a surplus of $134,600 for the common. The officers have recommended an issue of second mortgage equipment bonds, limited to $5,000 per mile. The amount now issued will probably be $1,500,000, and it is understood that they have already been negotiated.

Louisville, New Albany & Chicago.—President Thomas has issued a circular to the shareholders, in which an increase in the capital stock is proposed, and calling a meeting of the stockholders for Nov. 9. The circular refers to the success of the present management since it took possession of the property in discharging the floating debt of $2,000,000, as well as in improving the physical condition and earnings of the road. A large number of compromising suits have been amicably settled. Many important economies have been introduced in the operation of the road, which, with the limited capital at command, have resulted in a gain of $150,000 over the corresponding six months of last year. But the existing facilities of the road are taxed to their utmost. The company needs further capital to afford increased terminal facilities at Chicago, additional freight and passenger cars, and the replacement of wooden bridges and iron rails with steel bridges and rails. The fixed charges are already as heavy as prudent policy will justify, and the board thinks that the facilities required can be best secured by an increase of the share capital, which will not swell the fixed charges or create a floating debt.

Mount McGregor.—The road will be sold on Oct. 19, at Mount McGregor, N. Y., on a mortgage foreclosure judgment obtained by George West, of Ballston Spa. The sale includes the railroad, its rolling stock, etc., the Hotel Balmoral and all the company's land on the mountain.

Northern Pacific.—The company has applied to the New York Stock Exchange to list about $4,000,000 consolidated mortgage bonds, which have been issued to the company by the trustee under the general mortgage to retire first and second mortgage bonds, refund branch road bonds and for new construction and equipment. This makes the total amount of bonds issued about $42,500,000. The bonds were sold by the company last winter, and the proceeds were applied to the building of branch lines and to the purchase of equipment, locomotives and cars. The bonds are now to be listed at the request of the purchasers.

Ohio & Mississippi.—The announcement by cable this week of the formation of a plan for the reorganization of this road, and the transfer of its control to the Baltimore & Ohio, brings practically to an end negotiations that have been going on nearly a year. The full particulars of the plan are not given, but the holders of more than a majority of the stock have assented to the

agreement. A director is reported as saying that, "it is proposed to form a controlling company with $8,000,000 common stock to be transferred to the Baltimore & Ohio. The Ohio & Mississippi preferred stock is to receive $134 a share in first five per cent. income bonds and six per cent. in cash, the common stock to receive $300 a share in second income bonds and $800 in preferred stock of the new controlling company; the Baltimore & Ohio to guarantee interest on Ohio & Mississippi bonds to the extent of $1,100,000 annually in consideration of the stock of the controlling company." Beyond this brief outline nothing has been learned as to the particulars of the proposed scheme. The Baltimore & Ohio has now a strong representation in the Board of Directors. There is a traffic agreement between the two roads, and the Ohio & Mississippi has given the Baltimore & Ohio a direct line from Cincinnati to St. Louis.

The annual report for the fiscal year, which ended June 30, gives the following figures:

	1891.	1890.	Inc. or dec.
Gross earnings	$4,108,974	$4,214,747	D. $105,773
Oper. expen.	2,936,562	2,912,473	I. 24,089
Net earnings	$1,172,412	$1,302,274	D. $129,862
Fixed charges	1,210,053	1,219,845	D. 9,792
Deficit	$37,641	Sur. $82,429	I. $120,070

The company has raised no new money since October, 1886, and the large floating debt then existing has been practically cleared up, and all out of revenue. It will be necessary to continue this policy for two more years, unless fresh capital is provided. The road was short of cars in July and August this year. The total expenditure for work done on the road in the last five years, all of which under the English system would be charged to capital, has been $1,833,187. The unfunded debt June 30, 1886, was $1,006,598, and is now $594,719. The company should have $690,000 to put the line and equipment in proper condition to reduce operating expenses and increase earnings.

Oregon & Washington Territory.—Suit has been brought in the United States Circuit Court at Portland, Or., by the Farmers' Loan & Trust Co., of New York, against the railroad company to foreclose a consolidated mortgage held by the Trust Company, to secure bonds of the road to the amount of about $4,000,000.

Philadelphia & Reading.—Alfred Sully, I. and S. Wormser, of New York, and Edgar G. Miller, of Maryland, filed petitions in the United States Circuit Court in Philadelphia last week asking for leave to intervene in the suit of John Lorine against the Railroad Co., the Coal and Iron Co., and the Pennsylvania Co. for Insurances of Lives and Granting Annuities, all Trustees under the mortgage, which was brought to enforce payment of interest on the preference bonds, on the ground that the Reading's earnings warrant it. It is stated that the Wormsers holds $322,000 of the third preference bonds, Mr. Sully $805,000, and Mr. Miller $6,000.

Poughkeepsie Bridge Co.—The bridge and railroad system show a regular and encouraging increase in traffic. During the four months ending Aug. 31 the number of loaded cars passing over the bridge was 7,905, as compared with 4,530 cars during the same period last year. The gross earnings of the railroad system during the three months ending Aug. 31 were about $225,000 and the net $75,000. The charges during the same period, including taxes, were $90,000. This increase in the traffic leads the officers to hope that the railroad system will soon earn its fixed charges. During the period mentioned $25,000 was spent on improvements and betterments.

Rochester & Glen Haven.—The New York State Board of Railroad Commissioners has ordered that the company be relieved from operating its railroad from Nov. 15 until May 15 next. The line is only 3½ miles long and has an excursion business to the lake from Rochester in the summer, but little freight traffic.

St. Paul & Duluth.—The annual report for the year ending June 30, 1891, gives the following earnings:

GROSS EARNINGS.

	1891.	1890.	Inc.
Passengers	$512,156	$393,530	$118,626
Freight	1,054,955	966,363	88,591
Express	22,500	22,500	.....
Mail	18,312	18,262	50
Miscellaneous	14,016	9,872	4,144
Total	$1,621,939	$1,410,527	$211,411

OPERATING EXPENSES.

	1891.	1890.	Inc. or dec.
Maintenance of way	$218,416	$219,968	D. $1,552
Maintenance of equipment	145,357	141,260	I. 4,097
Conducting transportation	530,183	497,184	I. 32,999
General expenses	127,624	115,823	I. 11,801
Total	$1,021,580	$974,235	I. $47,325

SURPLUS EARNINGS.

	1891.	1890	Inc.
Surplus earnings	$600,357	$436,291	$164,066

Western Union Telegraph Co.—The report of the company for the fiscal year ending on June 30 shows surplus earnings of $5,674,365, or over 6½ per cent. on its capital stock. As the company paid dividends of only 5 per cent., the surplus for the year was $1,364,758. The increase in gross expenses was considerably in excess of that in gross revenues, but it was due in part to repairs of both Atlantic cables and one Gulf cable and to the extraordinary expenses incurred in consequence of the fire and the reconstruction of the main building in New York City. The expenses include $1,598,163 paid for rentals of leased lines, $2,500,627 for maintenance and rebuilding of lines, and $351,897 for equipment of offices and wires. The average tolls collected were 32 5 cents a message, an increase of 1 mill over the preceding year, but the average cost was raised by ½ cent a message to 23.2 cents. The additions to the plant in the year were 3,964 miles of pole lines and cables, 36,594 miles of wire, and 716 offices. The share capital was not increased and the funded indebtedness was reduced by $22,720.

The following table compares the principal features of the business for the past three years:

Year ending June 30—	1889.	1890.	1891.
Gross revenues	$20,783,194	$22,387,029	$23,034,327
Oper. expenses	14,565,153	15,074,304	16,428,742
Profits	$6,218,041	$7,312,725	$6,605,585
Interest and sinking fund	795,668	915,136	931,220
Balances	$5,422,373	$6,397,590	$5,674,365
Dividends paid	4,309,520	4,956,008	4,309,607
Surplus for year	$1,112,853	$1,441,582	$1,364,758

Southern Pacific Co.—The earnings of the Pacific system in August were $3,540,670, against $3,359,635 for the same month in 1890. The operating expenses were $1,826,486, against $1,778,992 in 1890. The net earnings were $1,714,184, and for the same period in 1890, $1,586,743. On the Atlantic system the earnings for August amounted to $975,587, and in 1890, $1,127,984. The operating expenses amounted to $707,649, as against $731,188. The net earnings were $267,937, while in 1890, $396,796. The net earnings of both systems for the first eight months to Sept. 1 amounted to $1,375,463. In 1890, for the same period there was a deficit of $133,063.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, Oct. 14, 1891.

The Commissioners of the Western Traffic Association were in session Oct. 8, 9 and 10, and considered a large number of important matters. The meeting of the Advisory Board, which was called for yesterday, has been indefinitely postponed on account of the probability that there would be no quorum present.

The Traveling Passenger Agents of the Burlington, to the number of twenty, in company with General Passenger Agent Eustis, are making an inspection trip over the system. Officials of the Santa Fe, Milwaukee & St. Paul and Northwestern are also out on inspection trips.

Geo. B. Reeve, of the Chicago & Grand Trunk, has resigned the position of chairman of the special eastbound committee of the Central Traffic Association and G. B. Spriggs, of the Nickel Plate, succeeds him.

Lake freights dull and lower with light tonnage.

It is alleged that the Baltimore & Ohio is cutting rates on corn via St. Louis and that there is likely to be a repetition of the trouble which arose last year on account of the action of that line. At that time Gill & Fisher, Baltimore grain dealers, were able to offer more for corn than other shippers, and it was claimed at the time that they had advance notice of the reduction in the rates subsequently made by the Baltimore & Ohio, thus enabling them to buy up large quantities of corn which went forward at the reduced rates. It is reported that they are now in the market making contracts for new corn for shipment via St. Louis to Baltimore at a fraction over one cent more than other shippers are able to bid, which gives rise to a strong suspicion that some deal has been agreed upon between them and the Baltimore & Ohio.

The question of the limitation of territory to and from which St. Louis, Peoria and Chicago rates shall apply on Missouri River traffic has been a subject for controversy in the Western Freight Association since May, 1890, and was finally appealed to the commissioners of the Western Traffic Association, who have rendered a decision, particularly defining the territory to be grouped with each city, and directing that where it is necessary to apply the rates outside of the prescribed limits, special commodity tariffs must be made to cover each case, instead of extending the whole tariff.

At the June meeting of the Trans-Continental Association, a resolution was adopted providing that association lake and rail lines, or their connections, at Lake Superior and Lake Michigan ports be allowed the same share of through Trans-Continental rates as is allowed the all-rail lines between eastern points and those ports, with the understanding that if the lake and rail lines charge less than the all-rail proportion, the difference should be absorbed by the Trans-Continental lines, the traffic to be covered by insured bills of lading. The resolution failed to receive the approval of all the general managers and the matter was brought before the commissioners of the Western Traffic Association. They have rendered a decision in which they decline to authorize the establishment of these divisions of the through rate, on the ground that such a rule would afford the lake and rail lines opportunity to disturb the established through rates, in consequence of the fact that the all-rail proportion is materially greater on some classes than the local lake and rail rates. They admit that there are instances where the all-rail proportions exceed the local rates, yet in other instances they are lower and in general they yield a less revenue than the roads would receive from a similar volume of local business, and while the situation as regards the all-rail lines is not altogether free from objection it is more controllable than via lake and rail. The fact that the lake and rail lines may be at a disadvantage as compared with the all-rail lines, on account of the insurance charge attached to water transportation was considered, but the commissioners understand that this has been remedied by the rail lines west of the lakes agreeing to absorb this charge.

Traffic Notes.

The merchants of San Francisco have taken steps to form a traffic association similar to those in St. Louis and Kansas City.

The Car Service Association of Alabama has been formed at Montgomery and will embrace the whole state, apparently including the Birmingham Association.

The New York Court of Appeals has affirmed a decision compelling the Grand Trunk to pay $10,000 damages on potatoes carried several years ago which were detained so long on the road that they sprouted badly.

Notice has been received by Attorney-General Stone, of Iowa, that the Burlington, Cedar Rapids & Northern, has applied for an injunction against the joint-rate order of the Railroad Commission, issued in August, 1890 The Supreme Court has affirmed the constitutionality of the order.

The Board of Rulings reports that the Wabash circular issued at Denver offering commissions on passenger business over the Niagara Falls Short Line was sent out by mistake, the intention being only to offer commissions on business to points in Canada, which commissions were abolished by mistake when the non-commission-paying agreement was made.

The Pennsylvania has reduced passenger rates between Columbus, O., and Chicago about 10 per cent., the reason, it is said, being that the Chicago & Erie uses mileage tickets in that territory to such an extent as to demoralize regular ticket rates. The Baltimore & Ohio has taken action similar to that of the Pennsylvania, and it appears that the reduction applies to local stations generally on both lines west of the Ohio River.

The Rome, Watertown & Ogdensburg, New York, Chicago & St. Louis and Chicago & Alton, having made a contract to carry 250 soldiers from Sackett's Harbor, N. Y., to Holbrook, Arizona, there was much speculation in the newspapers as to whether such business, going over a "boycotted" road, would be accepted by the New York Central on its short length of track between Niagara Falls and Buffalo, used by the Rome, Watertown & Ogdensburg. The troops finally went through, though the other roads seem to have made the whole affair as inconvenient to the Alton as was possible.

The several lines terminating at Kansas City, Leavenworth, Atchison and St. Joseph, Mo., have adopted new and elaborate rules to govern the reconsignment of grain from west of the Missouri stopped in transit at either of those points. The rules went into effect Oct. 1, and the business is subject to supervision by a joint agency established by and conducted pursuant to directions from the Chairmen of the Western Freight, Trans-Missouri and Southwestern Railway & Steamship Associations. A record is kept by the joint agent of the grain placed in elevators, by the registration of expense bills in the order of unloading into the elevators. Expense bills remaining uncanceled six months are dropped from the record.

Division of Through Rates Over the I. I. & I.

The action of the Joint Rate Committee and the Commissioners of the Western Traffic Association in readjusting the percentages via the "Three I" route is, as was noted last week, being vigorously opposed by several of the connections of that line. The principal traffic exchanged with the I. I. & I. has been dressed beef, packing house products and grain, en route from Missouri River points to the seaboard. The established divisions on this traffic are 20 per cent. to the western lines and 80 per cent. to the eastern lines of the rate from the Mississippi River to the seaboard. Under the order of the Joint Rate Committee the western lines set apart $\frac{6}{20}$ of their 20 per cent. and the eastern lines set apart $\frac{8}{80}$ of their 80 per cent., making 14 per cent. altogether allowed to the I. I. I. The new order does not change the established basis of division between the eastern and western lines in the slightest degree, but on the contrary affirms it.

After the Joint Rate Committee orders had been issued and approved by the Western Traffic Association, complaints were made that other traffic (not Missouri River) also needed readjusting, and the Joint Rate Committee's circular was modified; but this did not suit the Western Traffic Association, and the commissioners issued a circular saying that the ruling of the Board, as to the obligation of members of the Western Traffic Association, "is in no way impaired or modified, and that the lines in interest should see to it that any traffic transported by them is handled by them in accordance with the provisions of the Commissioners' circular. The result of the percentages established, so far as the Western roads are concerned, is to allow the I. I. & I. substantially the same earnings which it now receives on like business exchanged with the Atchison, Topeka & Santa Fé, and which must be assumed to be satisfactory to that company for its haul from Streator to Kankakee." The change effects a correction in the method of computation.

Texas Traffic Topics.

The commission is certainly reducing all rates a great deal. If it continues in that direction the situation will be a very gloomy one for Texas roads. However, such action can never bring about Galveston supremacy. The interstate lines built into Texas to enjoy a share of the traffic, and will not submit to any adjustment which will legislate them out of the privilege. The ultimate result will be to reduce the revenues of the railroads without building up abnormally any special market, for the reason that the rate adjustment formerly effective in Texas was the result of years of experience and the work of experts who were laboring constantly to so grade the rates as to put all markets on a parity.—*Interview with E. H Hinton, General Freight Agent of the Texas & Pacific.*

Westbound Passenger Business.

Commissioner James F. Goddard has just rendered a decision as arbitrator allotting proportions of first and second class passenger traffic from New York to points beyond the western termini of the trunk lines, in accordance with the Presidents' agreement. There is no pool on first and second class passenger business, but any excess of the percentages is evened up by changing the divisions of immigrant traffic. The proportions fixed by Commissioner Goddard are as follows:

N. Y. Central & H. R.	33.0	D., L. & W	5.5
Pennsylvania	25.0	N. Y., O. & Western	3.0
Erie	15.0	Lehigh Valley	3.0
Balt. & Ohio	9.5		
West Shore	6.0	Total percentage	100.0

The percentage given to the New York Central is considerably less than the actual proportion of the through west-bound business taken by the road. The Central has carried of first and second class business west: In 1887, 34.14 per cent.; in 1888, 35.80; in 1889, 38.39; in 1890, 32.73, and for the first three months of 1891, 38.07 per cent. Excepting the year of the strike, the high-class passenger business of the New York Central has shown a steady increase in its proportion to the whole through movement. Mr. Goddard's award indicates that the Central must surrender a portion of the immigrant travel. The gross annual revenue affected by the award is about $1,800,000.

Eastbound Shipments.

The shipments of eastbound freight, not including live stock, from Chicago by all the lines for the week ending Oct. 10 amounted to 60,025 tons, against 59,047 tons during the preceding week, an increase of 978 tons, and against 78,025 tons during the corresponding week of 1890, a decrease of 18,000 tons. The proportions carried by each road were:

	Week to Oct. 3.		Wk. to Oct. 10.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	8,102	13.5	7,747	13.1
Wabash	3,776	6.3	3,580	6.1
Lake Shore & Michigan South.	9,552	15.9	9,432	16.
Pitts., Ft. Wayne & Chicago	6,807	11.3	7,007	11.9
Pitts., Cin., Chicago & St. L	9,709	16 2	8,464	14.3
Baltimore & Ohio	4,665	7.8	4,316	7.3
Chicago & Grand Trunk	3,739	6.2	4,569	7.7
New York, Chic. & St. Louis	6,244	10.4	6,054	10.3
Chicago & Erie	7,431	12.4	7,878	13.3
Total	60,025	100.0	59,047	100.0

Of the above shipments 2,660 tons were flour, 23,812 tons grain, 1,834 tons millstuff, 4,071 tons cured meats, 8,606 tons dressed beef, 909 tons butter, 1,817 tons hides and 5,674 tons lumber. The three Vanderbilt lines carried 39.8 per cent. and the two Pennsylvania lines 27.5 per cent. The lake lines carried 103,125 tons, against 136,764 tons during the preceding week, a decrease of 33,639 tons.